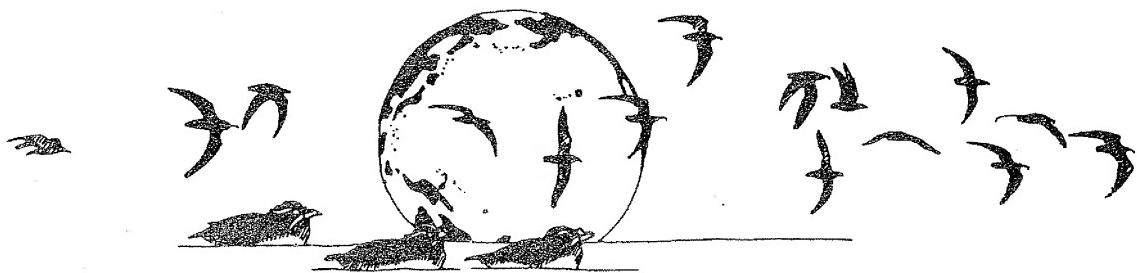


# PACIFIC SEABIRDS



A Publication of the Pacific Seabird Group

Volume 24 Number 1

Spring 1997

## **Dedicated To The Study And Conservation Of Pacific Seabirds And Their Environment**

The Pacific Seabird Group (PSG) was formed in 1972 out of a need for better communication among Pacific seabird researchers. The Group coordinates and stimulates the field activities of members involved in research and informs its members and the general public of conservation issues relating to Pacific seabirds and the marine environment. Group meetings are held annually and the PSG publication, *Pacific Seabirds* (formerly the *PSG Bulletin*), is issued biannually. Current activities include involvement in seabird sanctuaries, coastal surveys, seabird/fisheries interactions, and legislation. Policy statements are issued on conservation issues of critical importance. Although PSG's primary area of interest is the west coast of North America and adjacent areas of the Pacific Ocean, it is hoped that seabird enthusiasts in other parts of the world will join and participate in PSG. PSG is a member of the U. S. Section of the International Council for Bird Preservation. Annual dues for membership are \$20 (individual and family); \$13 (student, undergraduate and graduate); and \$600 (Life Membership, payable in six \$100 installments). Dues are payable to the Treasurer (see Membership page for details and application).

### ***Pacific Seabirds***

*Pacific Seabirds* (ISSN 1089-6317) is published twice a year, in the spring and fall, and contains news of interest to PSG members, including regional seabird research, conservation news, and abstracts of papers presented at the annual meeting. *Pacific Seabirds* is an outlet for the results of scientific research, as well as articles and shorter items on seabird conservation, seabird research activities, and other topics related to the objectives of PSG. All materials should be submitted to the Editor, while conservation-related material should be submitted to the Associate Editor for Conservation. Back issues of the *Bulletin* or *Pacific Seabirds* may be ordered from the treasurer: please remit \$2.50 each for Vols. 1-8 (1974-1981) and \$5.00 each for Vol. 9 and later (see Membership Application for details and order form).

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### **Donations**

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### **Pacific Seabirds Submission Deadlines**

All items intended for publication in Pacific Seabirds must be received by The Editor prior to March 15 (Spring issue) and September 15 (Fall issue). Manuscripts may be submitted at any time.

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## MESSAGE FROM THE CHAIR

### Accomplishments of the Past Year and Developing a Vision for the Future

As PSG comes to the end of its 24th year, it is important to reflect on our organization's accomplishments over the past year. It is equally important as we approach the year 2000 to think about our priorities for the years to come. Below I reflect on the past and the future from the perspective of Chair-Elect and now Chair.

Thanks to a high level of scientific expertise, PSG has been able to produce valuable information and recommendations on numerous management and conservation issues related to seabirds of the Pacific. Highlights of accomplishments in the last year include making recommendations on behalf of Pacific seabirds to the: (1) U.S. Fish and Wildlife Service (USFWS) regarding the impacts of long-line fishing on Short-tailed Albatross; (2) USFWS and Forest Service on PSG's Marbled Murrelet survey protocol and proposed salvage logging activities on federal land; (3) USFWS on the proposal to open Midway Island to the public; (4) a variety of organizations regarding the proposed IUCN seabird by-catch resolution; (5) U.S. Department of Interior and others on enforcement of the Migratory Bird Treaty Act in the 200-mile Exclusive Economic Zone (EEZ); and (6) U.S. Department of State on the conservation measures proposed by the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR; the above were efforts of the Conservation Committee and Executive Council). In addition, PSG helped to secure funding for Marbled Murrelet research in Prince William Sound, Alaska, and is continuing to build

cooperation for compiling seabird distribution data throughout the North Pacific into a common seabird monitoring database (Seabird Monitoring Committee). In terms of other key committee efforts, the Restoration Committee is close to completing the *Exxon Valdez* Restoration Workshop Report; the Marbled Murrelet Committee is developing an at-sea survey protocol; the Xantus' Murrelet committee is developing survey guidelines; and the Japanese Seabird Conservation Committee is working with other PSG scientists to locate Marbled Murrelets in Japan (see article on page x). I feel that through these efforts PSG has played an important role in letting agencies and others know that seabirds are an important component of the marine ecosystem. We have also had an impact on the management and conservation of Pacific seabirds. These accomplishments were possible through the dedication and efforts of many of PSG's members. I would like to take this opportunity to thank all of you involved in making these efforts possible, and to specifically thank Bill Everett, PSG's Chair during the last year and Craig Harrison, our Vice-Chair of Conservation, for a job well done. Thank you!!

PSG has grown in numbers and strength since I became a member in 1986. Our involvement in seabird issues has increased on both local and international scales. In the future, PSG has the opportunity to elevate the awareness of the general public and agencies about conservation of seabirds by increasing our communication and information dissemination,

and focusing our goals, objectives and action plans. In this age of computer technology and the existence of e-mail and the World Wide Web, we can easily, effectively and inexpensively assume a leadership role in disseminating information on seabirds and promoting stewardship of seabirds and their habitats based on sound ecological information. We also have the opportunity to consider additional options for increasing our effectiveness as a professional seabird society. Tony Gaston, our Regional Representative from Canada, and Julia Parrish have proposed several scenarios for taking PSG into the 21st century (see following article). I encourage all PSG members to think about our options for the future and contribute ideas for improving our impact on the world as it relates to seabirds and the health of their habitats. Whatever form our vision takes, I feel confident in PSG's abilities to make a difference and face future challenges. Our strength will continue to come from our members who take the time and effort to contribute to our efforts. I encourage all of you to become involved in PSG's future by helping to create a vision that increases our effectiveness in promoting the study and conservation of seabirds.

**S. Kim Nelson**, Chair, Oregon Cooperative Wildlife Research Unit, Oregon State University, 104 Nash Hall, Department of Fisheries and Wildlife, Corvallis, OR, USA 97331-3803. E-mail: [nelsonsk@ccmail.orst.edu](mailto:nelsonsk@ccmail.orst.edu)

## SOME PROPOSALS FOR CHANGES IN THE STRUCTURE AND MISSION OF THE PACIFIC SEABIRD GROUP - A VISION FOR THE 21st CENTURY

Prepared on behalf of the Executive Council of the Pacific Seabird Group by **Tony Gaston** and **Julia K. Parrish**

This article is presented as a basis for discussion among the membership, not as something that has any status as Pacific Seabird Group (PSG) policy. Please write to us, or better still send a letter to the editor of Pacific Seabirds for publication of your views on these and any topics that you see as related.

### Background

Environmental, economic, technological and philosophical change demand a constant re-evaluation of who we are, what we are doing, where we wish to go and how we can get there. These considerations apply as much to organizations as they do to individuals. For an organization to remain effective and relevant, it must adapt to the changing context provided by the societies in which it operates and to the changing interests and preoccupations of its members.

The Pacific Seabird Group was founded to promote the scientific study of marine birds in the Pacific. Initially, this was done by arranging annual meetings and by circulating a newsletter. These two activities still form the bedrock of PSG programs. Additional initiatives have been developed through the creation of subordinate committees that pursue particular goals: the Conservation Committee and the Marbled Murrelet Committee have been especially active in this way. Perhaps unconsciously, the PSG has been expanding its role as a centralized source of seabird expertise. Recent initiatives by the PSG, such as the *Exxon Valdez Oil Spill (EVOS)* Restoration Workshop and the Monitoring Database contract are clear examples of this. If the PSG continues to extend its scientific efforts and products, structural change in the organization is necessary.

In addition to its expanding role as collector and disseminator of seabird science, several other pressures are currently being exerted on the PSG which favor change:

- The ever-expanding range of activities in which the society is involved and the increasing amount of regulation that is being brought to bear on amateur/non-governmental organization (NGO) groups

is creating a growing amount of work for the executive officers (President, Secretary, Treasurer). For instance in 1996, our taxes took over 20 hours to complete, we received one subpoena, and not a day went by in which the President did not get PSG email. As presently constituted, the PSG is poorly structured to meet these demands. We suffer from too much administration heaped on the shoulders of too few, with no monetary compensation, and little kudos. If we are going to continue our current efforts, as well as expand our activities (e.g. workshops, databases, international committees, etc.), we need better organization;

- The increasing drive to "privatize" activities formerly maintained by the government has led to opportunities for NGO groups to develop programs that complement or replace those previously run by government agencies. PSG has an interest in seeing such efforts are well run, if we are not in fact running them ourselves;
- Increasing contact with seabird researchers and conservationists outside North America has led to greater interest in global, as opposed to local or regional issues (witness the Japan and Mexico committees);
- Advances in technology, especially associated with the internet, are making new opportunities available for communication with like-minded individuals and groups and for disseminating information relating to PSG programs and objectives.

Thus far, the PSG has responded to the challenges and opportunities outlined above in a piecemeal fashion, mainly through the initiatives of individual members. We believe that there is a need for a more comprehensive approach to the restructuring and re-orientation of the PSG and we set out some options below. However, we want to stress that those activities that historically constitute the core of the PSG: the annual meeting, our publications including Pacific Seabirds and occasional symposium proceedings, and the activities of the various committees should not be diminished in scope or depth. What we propose is an expansion that will build on the original aims of the PSG, adapted to the circumstances of the 21st century.

Most, perhaps all, of what we suggest will have been thought about and talked over by many people before, especially

those who have belonged to the PSG for a long time. Some of our ideas may have been rejected, with good reason, in the past. However, what may have been appropriate or inappropriate yesterday may look different today. We ask that you approach our ideas with an open mind.

### The Problems

The PSG has begun to operate as a clearing house for seabird monitoring, research, and "expert opinion". This is an administrative, and potentially a legal, headache. Who runs the show? Who takes the blame? Such questions argue for a clear mission statement and a clear understanding of the roles and responsibilities of all those active in PSG affairs.

The PSG (like most scientific, membership-driven organizations) is a voice heard mostly by its own members. This loses at least three questions: Do we want to be heard by others; If so, by whom; and how? Given the current status of many of the world's seabirds, there are good arguments that we should move beyond our own circle. To do so we will need to focus our efforts and decide what types of information we want to disseminate and to whom.

### The Opportunities

Many marine systems are threatened with a combination of the direct and indirect effects of human activities, including overharvest, pollution and habitat loss. Although these activities may affect large portions of marine ecosystems, the bulk of change goes un-noticed and/or unappreciated by the general public. Seabirds are a highly visible element in marine systems. Unlike many marine organisms with which the public does not readily identify, seabirds can act as vehicles with which to garner public support. Because of its broad membership, including international representation in the academic sciences, management and scientific agencies, non-governmental organizations, and scientific and resource consultancies, the PSG is exceptionally well placed to address the conservation needs of the seabirds of the Pacific, and secondarily in the world's oceans.

Several new initiatives have increased the international scope of PSG (Mexico and Japan committees) and there seems to be a need for more global thinking about

## FORUM

seabirds. As an organization, the PSG has developed a distinctly international flavor, without actually severing from its roots in western North America. We are well placed to become global, given current international committees, ongoing interest in international conservation issues, and the presence of a multi-continental membership. Our interest in issues such as Clipperton Island and the Japan Initiative indicate a willingness on the part of the members to become more than just a North American-based organization.

Recent initiatives by the PSG (e.g., EVOS Restoration Workshop, Monitoring Database) have resulted in significant sums of money being channeled through the organization. In the case of the EVOS workshop this required hiring a temporary administrator. If initiatives of this type continue, PSG could ultimately command the resources to hire some kind of permanent staff.

Bearing in mind all of the above, we suggest the following statement to encapsulate the future vision of the PSG.

### Mission Statement

The goal of the PSG is to maximize the collection and dissemination of best available science on seabirds of the Pacific, and secondarily the world, for the purposes of education, conservation, and management.

### Strategies

- The Pacific Seabird Group should continue its traditional role as a forum for discussion and dissemination of scientific and conservation issues relating to Pacific seabirds through meetings and publications. It should continue to act as a conduit for scientific advice relating to seabird issues and to make appropriate interventions in regulatory and legal proceedings relating to the wellbeing of seabird populations.
- In pursuing these fundamental goals, PSG should develop and maintain close links with seabird researchers throughout the Pacific and should develop a coordinated research and monitoring program on seabirds across the North Pacific to maximize the value of information obtained by individual investigators and collaborating organizations.
- PSG should seek to collaborate with other seabird groups around the world to disseminate information on seabirds that is of global, rather than regional significance, and jointly to publish an interna-

tional journal of marine birds that would be of sufficient quality to attract top quality papers.

- To facilitate the above, the group should seek to establish a permanent secretariat to handle the increased administration involved in running the PSG and to extend the coordination of programs both across the Pacific, and internationally. In addition, PSG should explore all avenues for the application of internet technology to disseminating information relevant to the group's aims.

Initially, we envisage setting in motion the following activities: First, the Chair recruits national representatives from countries outside North America where the PSG has a significant membership, so that the Executive Council (EXCO) becomes genuinely international. National representation for Russia and Japan is an obvious first step; Second, the Chair or designate opens a dialogue with Birdlife International, and others concerning the possible role of the PSG in an international seabird network, involving other marine bird organizations (e.g. the Seabird Group, Australasian, South African, Mediterranean seabird groups, etc.), as well as regional ornithological societies (e.g. Ornithological Society of the Middle East, Oriental Bird Club) and the British and French Antarctic Surveys. The resulting organization "International Seabird Network" (?) would take a global approach to seabird research and conservation and publish an international journal of seabird research.

These two initiatives go hand in hand. The establishment of an international seabird network would be a time-consuming task and probably not possible on top of existing PSG activities. However, it would be a legitimate and possibly attractive goal to be promoted as part of the funding application for a permanent staff. Hence: Third, a small (<10) group composed of EXCO and/or other volunteer members is tasked with preparing a two-year business plan for submission to suitable sponsors (private foundations) to raise funding for a central office, with full-time staff (1-2 persons). The proposal would envisage an initial 2-year trial period, to be funded by the donor(s). Annual progress and goal setting would be reviewed by the staff and EXCO, with an annual report published in Pacific Seabirds for member input. Following the termination of the initial 2-year trial period the employed staff would be expected

to have developed fundable programs, the overheads of which would pay her/his/their salaries.

### Some Thoughts On All This - What advantages are there to an International Network?

- Keeps seabird people everywhere in closer touch;
- Creates a greater weight of numbers when making representations on seabird conservation issues;
- Gives the potential for a really credible joint journal;
- Reduces redundancy in newsletters and in conservation initiatives (not much of this at present, though, owing to too many issues and too few people);
- Increases the value of PSG membership (possibly), and hence potentially attract more members.

### What Sort Of Things Could We Do With A Permanent Staff?

- Lighten the load on the present EXCO, especially the Chair and Treasurer, allowing them more time for reflection and direction;
- Create an organizational memory;
- Handle annual meeting logistics in conjunction with the local committee. This will lighten the load on the then present EXCO, especially the Chair and Treasurer, allowing them more time for reflection and direction committee;
- Broaden our educational impact by issuing press releases at our annual meeting, and in conjunction with workshops; provide periodic indicator analyses of the monitoring database to be dispersed to relevant agencies, legislators, and the press; produce regular publications in science-oriented popular magazines; and maintain an up-to-date webpage and list-server;
- Facilitate our ability to bring existing knowledge together - The PSG database project is a good example of ways in which the organization can be more than the sum of its parts. When this project is completed, individuals accessing the database should be able to look for regional and even basinwide effects, beyond those affecting their local system. This approach advances the ways in which existing data can be used. - PSG has begun to convene workshops in which a set of individuals are brought together to provide expert advice on, or to promote understanding of, a particular topic. In future, this approach

should be strengthened as well as proactive; that is, PSG should take the initiative to put together workshops, symposia, etc. on topics of current relevance;

- In collaboration with other NGO groups, develop volunteer programs for seabird monitoring and banding;
- In collaboration with other seabird groups, administer the publication of an international seabird journal;
- Mount more effective publicity campaigns for seabird conservation;
- Submit grant proposals to governments and foundations to accomplish seabird conservation goals.

What we want avoid is sending endless mailings to potential donors asking for cash, making unsupported statements about threats to seabirds, and publishing a glossy magazine. Clearly, we need to proceed incrementally. The PSG cannot afford to hire even part-time staff at present and we are opposed to using existing endowment or operating funds to start an office. However, we might be able to persuade a foundation to provide us with seed money to pay for a full-time staff for a 2 year start-up period. In the longer term, we might envisage a small office of

2-3 people administering both the PSG and the International Network. However, to maintain the identity and traditional activities of the PSG we recommend that the two organizations be kept separate and that the PSG simply offer to take the lead in developing a network on behalf of the various marine bird groups.

All of these activities can be greatly facilitated by creative use of the internet. The establishment of an intercontinental editorial board and the production of a purely electronic newsletter for the International Network is probably very feasible. Moreover, as a first step, this would serve to develop the structures on which an international journal could be based.

In considering the above ideas, please ask yourself the following questions:

- Do you think the PSG is currently doing enough to promote research, education, conservation, and management of Pacific seabirds?
- Would you be interested in seabird news from Tasmania or Rodrigues - would you pay anything to know about it?
- Have you ever felt the need for a genuinely international seabird journal which might form the first resort in re-

searching any question on marine bird research?

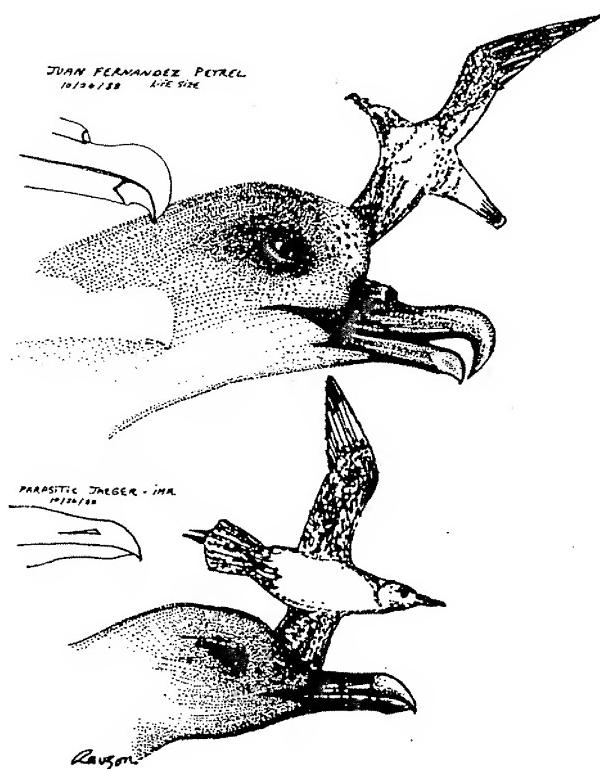
- Would you value a comprehensive database of seabird information Pacific-wide and reaching back several decades?
- Would yet another charitable NGO be just too many?

If you respond positively to our ideas, how can you, personally, help us to make them manifest on the material plane? We, and the EXCO, invite your response either directly to us or in an open letter to the editor of *Pacific Seabirds*.

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# REVIEW ARTICLES

## UPDATE ON SEABIRD BYCATCH ISSUES IN THE NORTH PACIFIC

By Vivian M. Mendenhall and Janey Fadely

Incidental mortality of seabirds in the world's longline fisheries has become a *cause célèbre* among conservation groups. Longline fishing has expanded greatly in the world's oceans during the past 2 decades. Fishing vessels set lines up to several km long that carry up to several thousand hooks. Lines are suspended in mid-water to take pelagic fish (swordfish and tunas) at low latitudes; groundfish such as halibut and cods are caught on bottom-set lines at high latitudes. Seabirds, especially species that normally feed on squid or detritus near the surface, often attack baited hooks as they start to sink behind the vessel. Some birds steal bait; others are caught and drowned.

Mortality in longlines potentially can harm seabird populations. Declines in several species of southern hemisphere albatrosses are attributed to bycatch mortality (e.g., Croxall et al., J. Anim. Ecol. 59:775, 1990). The U.S. Fish and Wildlife Service (USFWS) has recently estimated bycatch of Laysan and Black-footed albatrosses in Hawaiian waters at about 3,000 per year [Pacific Seabirds 23(2):13]. Preliminary analysis of Alaskan seabird bycatch suggests that about 10,000 birds are caught annually (USFWS, unpubl. data).

Alaskan longline fisheries primarily take Pacific cod, sablefish (blackcod), and halibut. The birds most often caught in these fisheries are Northern Fulmars, Black-footed and Laysan Albatrosses, and various gulls. However, the species of greatest concern is the Short-tailed Albatross (STAL), the only endangered seabird in Alaskan waters, whose world population is about 800. Five STAL are known to have been caught in American long-line fisheries: 1 in 1983, 1 in 1987, 2 in 1995, and 1 in 1996. The most recent 3 birds were caught in the sablefish fishery, where birds have been identified by observers since 1993. The 1987 bird was reported by a halibut skipper. The halibut fishery may have caught additional birds, but it is managed separately from all other North Pacific fisheries and reports few bycatch

data. Fisheries off Japan also probably catch birds, but they also collect no data on the subject.

The Endangered Species Act (ESA) requires agencies whose actions might jeopardize a threatened or endangered bird to consult with USFWS. NMFS has consulted with USFWS regarding STAL take in the groundfish fishery since 1989. USFWS believes that the current level of mortality caused by the fishery does not represent jeopardy to the species (defined as "appreciable decline in survival and recovery"). This decision was based on the fact that, according to monitoring by H. Hasegawa (unpubl. data), the breeding population of STAL is increasing. Based on a maximum of 2 STAL reported dead in one year, NMFS is authorized to conduct a fishery as long as 2 or fewer birds are reported caught per year (currently stated as 4 birds in 2 years). NMFS also must abide by other conditions, including: 1) reporting of STAL bycatch by fishery observers, 2) salvage of dead STAL, 3) education of fishers in bycatch avoidance, 4) bycatch deterrent devices must be used by fishers, and 5) NMFS must design a study to evaluate the effectiveness of deterrents. (Bycatch deterrent devices are described below.) If more than the authorized number of birds are caught, NMFS must close the fishery until the agencies have consulted again; USFWS will determine whether the new level of mortality represents jeopardy.

NMFS recently requested that FWS initiate a consultation with them over STAL bycatch in the North Pacific halibut fishery.

Collection and analysis of bycatch data are a cooperative effort among several agencies. Reporting protocols were developed originally by Pat Gould of the Biological Resource Division, U.S. Geological Survey. USFWS helps to train fishery observers in bird identification. USFWS and Pat Gould are starting to analyze bird bycatch data, and Pat and NMFS are working on methods for estimating total bycatch of STAL from the small sample of reported bycatch.

The population ecology of STAL has been studied in the breeding colony since

1977 by Hiroshi Hasegawa of Toho University in Japan. USFWS, NMFS, and the University of Michigan (Jean Cochrane and Anthony Starfield) are cooperating on a modelling project with the goal of estimating the impact of current bycatch and other factors on STAL populations.

The conservation community became actively concerned about bycatch of birds in longlines in 1996. The International Union for the Conservation of Nature passed a resolution in August that called on all nations to "adopt the goal of eliminating seabird bycatch within longline fisheries." This laudable goal probably cannot be reached unless the fisheries are closed completely. However, the resolution highlighted the fact that bycatch mortality can be greatly reduced if fishing vessels use various techniques to discourage birds from trying to steal bait.

Most deterrent methods were developed in the south Pacific, particularly by Nigel Brothers of the Tasmanian Department of Parks and Wildlife Service, Australia. The measures are required in waters of Australia, New Zealand and the Antarctic. Deterrent methods are used primarily while gear is being set, when birds are most vulnerable to being caught. The principal methods used in the southern hemisphere are fishing at night, weighting of lines so that hooks will sink rapidly, and deployment of a streamer line or "Tori line" astern. This is a strong line at least 150m long, from which is suspended rubberized side lines whose tips skim the water behind the vessel.

In late 1996 the North Pacific longline industry proposed that they themselves be required to use bycatch deterrent measures. This was an unprecedented action by the industry. Its motivation was concern both for the STAL and for problems that could afflict the industry if too many birds are caught. Thorn Smith, executive director of the North Pacific Longline Association, drafted the regulations with input from USFWS and NMFS. The proposal was submitted to NMFS over the signatures of approximately a dozen industry associations. NMFS processed the proposal rapidly, and in December, the

North Pacific Fisheries Management Council (NPFMC) approved it. The final regulations were published on 29 April in the Federal Register (FR 62(82):23176).

The rules require [my explanations added]:

"I. Use hooks that, when baited, sink as soon as they are put in the water." [This could be accomplished by the use of weighted groundlines and/or thawed bait.]

"II. Any discharge of offal from a vessel must occur in a manner that distracts seabirds, to the extent practicable, from baited hooks while gear is being set or hauled. The discharge site [for offal] must either be aft of the hauling station or on the opposite side of the vessel ...

"III. Make every reasonable effort to ensure that birds brought on board alive are released alive [and well] ...

"IV. Employ one or more of the following seabird avoidance measures:

"A. Tow a streamer line or lines during deployment of gear to prevent birds from taking hooks.

"B. Tow a buoy, board, stick or other device during deployment of gear, at a distance appropriate to prevent birds from taking hooks ..." [This object rushes towards the baited hooks and scares the birds.]

"C. Deploy hooks underwater through a lining tube at a depth sufficient to prevent

birds from settling on hooks during deployment of gear.

"D. Deploy gear only during the hours specified below, using only the minimum vessel's lights necessary for safety." [The table provides times of night for each longitude and month. Another option must be used during June and July, when there is no night in Alaskan waters.]

Similar regulations will be applied to the halibut fishery within a few months; they were proposed to NMFS by the NPFMC in April. The regulations are being criticized by some conservationists as not being stringent enough. Critics suggest that the new regulations should be the same as those in the Antarctic. The U.S. and other nations require Antarctic fishing vessels to follow the measures listed above, except for IV(B) and IVC, all at the same time. (The Antarctic regulations often are referred to by the name of regulatory body, the Commission for the Conservation of Antarctic Marine Living Resources, or CCAMLR.)

Biologists and fishers who contributed the North Pacific proposal believe that these regulations re better at present. It seems premature to specify details of methods for the North Pacific now, since no information exists on how well they work here. Weights and towed objects are being used by some fishers here, and there is anec-

dotal evidence that they are effective, but no scientific observations have been made of them. Streamer lines and line-setting tubes are being tried this year for the first time in the North Pacific. The CCAMLR regulations were based on several small studies of deterrents under local conditions (e.g., Brothers, Biol. Conserv. 55:255, 1991). The correct construction of a deterrent depends on fishing methods; e.g., the length and spacing of streamers are determined by the height of the vessel's stern and the speed with which fishing lines are set.

A statistically-designed evaluation of deterrent methods will be carried out by NMFS in 1998. Preliminary information will come from the experiences and suggestions of fishers while using various devices under real fishing conditions. In order to promote understanding of the regulations and participation in evaluation, USFWS, NMFS, the North Pacific Longliners Association, and others are cooperating to disseminate information via brochures, posters, trade fairs, and the press.

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# ABSTRACTS

## ABSTRACTS OF PAPER AND POSTERS PRESENTED AT THE PSG ANNUAL MEETING, PORTLAND, OREGON, JANUARY 1997

### PLENARY TALKS

#### THE DIFFERENCE BETWEEN REAL AND IMAGINARY SEABIRD STUDIES

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People have always been interested in seabirds as a source of first food, feathers and fertilizer, and then information (often falling into similar categories). The Classical Greeks made much progress studying them, until academics put an end to it for 2000 years. Until recently the birds were thought to live in a formless void out at sea which nobody considered their business, until many of our young people (including me at the age of 10) were drafted into the Royal Navy or posted to islands during World War II, and a society was then set up in the Navy (which has a history of support for research since the time of Cook and Darwin) to continue their work, and it has just celebrated its 50th anniversary. When I grew up and became involved in the analysis of its results it appeared too little was being done at the land-sea interface, where many important things happen, so in 1960 I proposed to selected academics that we form a group to promote local work. They saw no profit in it, but five years later the amateurs, who had found that sea-watching often revealed supposedly rare birds, proved enthusiastic.

This anticipated three emerging crises, over pollution, fishing, and conservation of the breeding-places. Unfortunately they have led to much loose thinking by armchair ornithologists about threats to seabirds and possible remedies, resulting in much at best irrelevant and at worst unkind "research" and bad advice. Problems which require more attention include the impact of natural forces such as long and short-term meteorological and oceanic fluctuations and volcanic eruptions, orders of magnitude greater than anything yet achieved by man; the extent to which such factors may cause birds to move around, so that possibly attention is not always

being paid to the right problems at the right times and in the right places, or the money raised to combat them spent as effectively as it might be; and indeed often whether the birds are even being identified and counted accurately, and correct and relevant conclusions drawn from the results. There is a need for critical examination of such considerations based on more solid fieldwork, before a new generation decide to make their mark by doing this for us.

#### PRINCE WILLIAM SOUND SEABIRDS: STABILITY AND CHANGE

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The spill of the oil tanker *Exxon Valdez* in 1989 was a major perturbation for Prince William Sound (PWS), Alaska, but it occurred against a background of other natural and human-caused perturbations that may have masked or accentuated its effects. The *Exxon Valdez* Oil Spill Trustees, freed from the need for litigation-based science, initiated three large projects to achieve an understanding of this background. One of these, the Alaska Predator Ecosystem Experiment (APEX Project), is using an ecosystem approach to determine whether a change in food availability in the Sound has occurred that might be limiting recovery of several seabird and marine mammal species. APEX has eighteen subprojects, looking at everything from fish distribution and diet, through seabird foraging and diet, to reproductive success and population dynamics. The project focuses on the Sound, but also looks at the dense bird populations of the Barren Islands and the more stable populations of Kachemak Bay, in lower Cook Inlet. This is a report on the first two years of the project's five-year lifespan; it is very much a collaborative work in progress.

Initial analysis of pre-existing trawl data for the Gulf of Alaska suggested that major ecosystem shifts occurred before the spill, with lipid-rich pelagic species such

as capelin and crustaceans replaced by lipid-poor demersal pollock and by predatory cod. In PWS, Pigeon Guillemots switched from mixed diets of pelagic and inshore fish to primarily inshore species such as gunnels. Marbled Murres switched from sand lance to juvenile cod. Populations of fish-eating seabirds and marine mammals decreased, while those eating shellfish and other benthic species remained stable. More recently, there is evidence of a return ecosystem shift to capelin and sand lance.

For seabirds, PWS appears to be quite different from Cook Inlet and the Gulf of Alaska. In PWS, the commonest bird, Marbled Murrelet, is a solitary nester that often feeds alone or in pairs. Common Murres, a large-patch specialist, are rare in the Sound but common as a nester and in foraging flocks in the Barrens and Kachemak Bay. Direct acoustic surveys of fish in the Sound show only small surface patches of fish, with most of the biomass below the reach of surface-feeding seabirds. Forage flock size is correspondingly small. In contrast, both direct acoustics and large feeding aggregations of Hump-backed Whales and seabirds around the Barrens and northeast Kodiak Island demonstrate the presence of kilometer-sized patches of capelin.

In PWS, Black-legged Kittiwakes and Glaucous-winged Gulls are sometimes dependent on deep-diving Marbled Murres or Tufted Puffins to bring prey to the surface, where the larids take them directly or through kleptoparasitism. Murrelet and kittiwake flocks tend to occur closer inshore and in shallower water than do the smaller puffin flocks.

Seabird reproductive responses to between-year and between-region variations in prey composition and abundance appear to be complex. Kittiwakes show a narrow choice of foraging habitat but a wide spectrum of foraging ranges and patch densities. Guillemots have limited foraging habitats and range, but select a wide range of prey densities. In contrast, Tufted Puffins use a variety of foraging ranges, but usually forage on low-density prey.

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Variations in foraging effort, such as distance traveled, meal size, and number of feedings may buffer reproductive success. Variation in reproductive parameters appear to be linked to lipid levels in diets of kittiwakes, but not of puffins which have young that may make more efficient use of low-lipid prey. Guillemot breeding numbers appear to reflect the abundance of lipid-rich prey, but reproductive success may itself be insensitive to lipid levels.

### AGE AND EXPERIENCE AS FACTORS IN SEABIRD BREEDING SUCCESS: LESSONS FROM THE THICK-BILLED MURRE

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Changes in breeding success with age have been reported for many bird populations and are almost universal among seabirds. The cause of such changes has been variously ascribed to changes in optimal reproductive investment, to changes in foraging skill with increasing age, and to improvements in breeding competence with increased breeding experience. Variation in age at first breeding within seabird populations means that breeders of a given age include individuals with different amounts of prior breeding experience. This allows us to distinguish between the effects of age and experience in determining reproductive success.

At Coats Island, northern Hudson Bay, a study of the reproductive success of Thick-billed Murres in relation to age has been ongoing since 1990. Age at first breeding varied from 3-8 years. Mean reproductive success increased with age up to 10 years. Most of the difference in reproductive success among age classes was established during the incubation period. The success of young birds in rearing chicks, if they managed to hatch them, was not significantly lower than that of older birds, although the chicks of the young birds tended to grow more slowly, presumably because they were fed less. Experienced pairs, comprising birds that had bred for at least three years previously, achieved the maximum mean success of about 0.8 chicks/pair. The success of pairs comprising one experienced and one young bird was closer to that characteristic of the age class of the young bird than that of experienced pairs.

When birds of the same age, but different experience, were compared, female success increased with experience more than male success. When birds of the same experience but different age were compared, age had little effect for females, but had a significant effect for males. Birds mated to experienced breeders did better than those of the same age and experience mated to inexperienced birds. The effect of age on breeding success found for male Thick-billed Murres may relate to the fact that birds starting to breed at an older age generally mate with more experienced partners than those starting young.

The results obtained for Thick-billed Murres do not match those obtained for other seabird species, which tend to reach asymptotic levels of breeding success within two years of starting to breed. The reason for this difference may lie in the importance of site quality for murres and the fact that as birds gain in experience they tend also to attain better quality sites or mates. Overall, it appears that increase in experience is the main factor causing reproductive success in seabirds to increase with age.

In populations where birds tend to return to the same site each year, the new partners of birds that have lost a mate since the previous season are generally birds of limited breeding experience. Consequently, a bird that has lost its mate will usually have lower reproductive success in the first year or two after the loss than it had before. This potentially leads to a direct and non-compensatory effect of adult mortality on reproductive success. Such an effect has implications for the recovery of populations following oil spills, or other catastrophic mortality.

### PAPERS

#### EXPERIMENTAL RELEASES OF OIL-SPILL REHABILITATED COOTS: TESTING THE HYPOTHESIS OF LINGERING EFFECTS

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In spring 1995, 37 oil-rehabilitated coots (RHB) from Southern California were radio-tagged (with mortality detectors), color-marked for individual recognition, wing-clipped (one wing), and "soft-released" into two experimental marshes near Davis, California. 38 matching, non-rehabilitated coots (CON=controls), captured in the Central Valley, were similarly handled, mixed equally, and released. Supplemental food was provided. We studied survival, behavior, and condition, comparing RHB and CON. Behaviors were quantitated daily and the enclosed treatment group sampled monthly (4 periods) to determine health (via blood sampling). As old remiges were replaced, individuals dispersed and were monitored 3 times with aircraft over northern California.

Survival prior to normal dispersal was significantly lower in RHB coots ( $\chi^2$  tests:  $P<0.01$  in enclosure;  $P<0.05$  overall). Overall survival was 49% in RHB and 76% in CON. RHB coots preened more both on land and on water, slept less during the day, and exhibited feeding and drinking behaviors more frequently than CON coots (Mann-Whitney U-tests,  $P<0.05$ ). Feather wear in RHB coots was greater. RHB coots completed their annual molt about 2 weeks ahead of CON and dispersed sooner, but directions of dispersal were the same. RHB and CON coots began equivalent in weight, RHB lost weight initially in comparison, but recovered after 1-2 months when both groups finished lighter (as expected for post-breeding birds). Health parameters are reported in the next paper.

#### VARIATION IN LIPID CONTENT OF FORAGE FISHES AND ITS INFLUENCE ON PRODUCTIVITY OF SEABIRDS IN THE EXXON VALDEZ OIL SPILL AREA

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Lipid content of prey is a primary influence on energetics and potentially productivity of piscivorous seabirds. We measured lipid content of forage fishes to determine energy densities, which were used to estimate energy provisioning rates to seabird broods in the Exxon Valdez oil

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spill area. Lipids ranged from 3% of dry mass in juvenile pollock to 48% in juvenile herring. Herring and sandlance had the highest lipid contents and energy densities, gadids (pollock, cod, tomcod) had the lowest, and nearshore demersal fishes (blennies, sculpins) were intermediate. Energy densities ranged from 2.0 to 10.0 kJ/g fresh mass. Thus if parental provisioning rates are constrained, the lipid content of forage fishes can make as much as a fivefold difference in nestling energy intake rates.

Diets of Black-legged Kittiwake nestlings at three colonies in Prince William Sound were dominated by juvenile herring and sand lance. Higher energy density and larger meal size resulted in higher energy provisioning rates to kittiwake broods at Shoup Bay compared to Eleanor Island. Incidence of brood reduction was lower at Shoup Bay than Eleanor Island, suggesting that productivity of kittiwakes is limited by availability of high-quality forage fishes (i.e., juvenile herring and sand lance).

**AT-SEA DENSITY MONITORING OF MARBLED MURRELETS IN CENTRAL CALIFORNIA: METHODOLOGICAL CONSIDERATIONS**  
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In 1995, we conducted at-sea line transect surveys for Marbled Murrelets to determine density off the coast of central California and to explore the utility of various survey protocols. Surveys were designed to compare line versus strip transect methods, and reveal the effects of distance from shore, viewing conditions and seasonal trends on density estimates. We conducted 12 paired (24 total) at-sea line and strip transect surveys that were 20 km long at 400 m and 800 m from shore on consecutive days. We also performed nine surveys that were 10 km long and at distances of 400 m, 900 m, 1400 m, 2400 m, 3400 m and 4400 m from shore. Density estimates calculated using line transects were significantly greater than estimates based on strip transects of 100 m and 200 m widths. Marbled Murrelet den-

sity ranged from 2.4 - 39.4 birds/km<sup>2</sup> at 400 m from shore and from 0.0 - 16.5 birds/km<sup>2</sup> at 800 m from shore. Density was higher on the 400 m than on the 800 m survey on 22 of 24 survey days. Densities measured on consecutive days were highly correlated on the 400 m transect but not on the 800 m transect. Line transect densities on the 400 m transect were higher when conducted under better viewing conditions. Statistical power analyses are presented to show the relative power to detect trends in population density using various survey protocols including varying number of survey replicates per year and use of line or strip transects. We suggest that at-sea surveys should focus on detecting trends in density rather than population size.

### CASSIN'S AUKLET NESTLING DEVELOPMENT AND DIET: CONTRIBUTIONS OF OCEANOGRAPHIC CONDITIONS TO INTERCOLONY VARIATION

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Knowledge of the marine prey base species composition and productivity are fundamental to interpreting the causes of variation in seabird reproductive success. We compare nestling development of Cassin's Auklet (*Ptychoramphus aleuticus*) at Triangle and Frederick Islands which lie in different oceanographic domains along the British Columbia coast. Growth rates were higher on Frederick Island in 1994, 1995 and 1996. The difference in growth was most extreme in 1996 when nestlings on Triangle Island experienced almost complete fledging failure. We will evaluate the contribution of nestling diet species composition to the observed variation in growth. We will examine historical records of nestling diet and growth from the same colonies in relation to recent shifts in levels of winter primary production off the west coast of Vancouver Island.

### EFFECTS OF HUMAN DISTURBANCE ON BREEDING BIOLOGY OF MAGELLANIC PENGUINS

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The effect of human disturbance on wildlife populations is a growing concern. Increasing exposure of penguins to human activities associated with tourism, make it essential to understand the effects of human disturbance on penguin populations. Magellanic Penguins at Punta Tombo, Argentina are an ideal population for investigating effects of human disturbance because they have been the subject of a long-term intensive scientific study that employs commonly used seabird research methods, and they are also an increasingly popular tourist attraction. Using data from six breeding seasons at Punta Tombo, we examined the effects of both research and tourism-related disturbance on various aspects of penguin breeding biology, including egg hatching, chick growth, chick survival, fledging success, site fidelity, and mate fidelity. We found that our research program appeared to negatively affect several breeding parameters of birds in study areas. Most of these effects were not due to obvious injuries to chicks and eggs caused by researchers, but were related to more subtle effects of nest visitation. Intensity of research activity (e.g. frequency of nest visits by researchers) and type of research activity to which the penguins were subjected (i.e. whether birds were handled or merely observed) also affected disturbance. The results of this study indicate that effects of human disturbance on penguins are subtle but significant.

### MARBLED MURRELET CRITICAL HABITAT: THE VALUES AND LIMITATIONS

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The U.S. Fish and Wildlife Service (FWS) designated approximately 3.9 million acres of forest land as critical habitat for the Marbled Murrelet on May 24, 1996, including 3 million acres of Federal lands in Late-Successional Reserves. No marine areas were included. Critical habitat is defined as areas containing the features essential to conservation of the species which require special management consideration or protection. Federal agen-

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cies are required to ensure that all their actions in critical habitat are not likely to appreciably diminish the value of critical habitat for the survival and recovery of the species, but does not create a management plan or prescribe specific management actions. Wilderness areas, National Parks, and National Wildlife Refuges were not included because they are already protected by law. Marine areas were not included because of the existing laws aimed at reducing or eliminating marine threats. Critical habitat focused on nesting habitat and includes any area within the boundaries that contains individual potential nest trees, or is  $\frac{1}{2}$  site-potential-tree height and within 0.5 mile of a potential nest tree. Critical habitat is one of several tools for recovering species but will not achieve recovery on its own.

### REPRODUCTIVE SUCCESS OF WESTERN GULLS ON ALCATRAZ ISLAND

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In this study I document reproductive success of known-experienced Western Gulls breeding on Alcatraz Island during the 1994-1996 breeding seasons to provide information on the ultimate effect of breeding experience on nest microhabitat, parental investment patterns of chick-rearing and defense, and the interaction between sex, experience and body condition of breeding adults. Alcatraz supports the second largest breeding colony of Western Gulls in northern California, yet it is visited by more than 4,000 visitors daily that may influence breeding success. Information from a long-term banding program was used as background data for this colony, and reproductive success data were collected for the Cistern subcolony from 1994 to 1996. In general, clutch size and fledging success remained stable across years, although the gull population significantly increased. Impacts of tourism were minimized by closure of many areas of the island during the breeding season; however, a special event staged on the island during the 1996 season occurred during peak hatching, and caused significant behavioral and reproductive success impacts to the gull population. The information from this study will be used to provide a long-term management plan for this species, and will assist park

managers to balance the natural history and visitor use goals of the island.

### RADAR CENSUS OF MARBLED MURRELETS AT 14 WATERSHEDS IN CLAYOQUOT SOUND, VANCOUVER ISLAND

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We used two high-frequency marine surveillance radar units to count Marbled Murrelets entering the mouths of 14 watersheds in Clayoquot Sound, British Columbia, at dawn and dusk in 1996. Radar detections of birds entering the watersheds were higher than those recorded circling or leaving. Maximum counts at all stations totaled 4071 incoming birds at dawn and 1016 at dusk. Numbers of murrelets entering watersheds were compared with a range of landscape parameters, including area and length of watersheds, topography, area of valley-bottom old-growth forest, proportion of watershed affected by clearcut logging and roads, and light distance from oceanic foraging sites. In general the radar counts followed seasonal trends seen in audio-visual surveys (Pacific Seabird Group protocol) at inland stations in the watersheds. Counts of murrelets entering the Bedwell-Ursus watershed (the only one sampled previously) were about half of those recorded in 1995, which conformed with the decline reported in audio-visual detections. We review the value and limitations of radar as a census tool for landscape-level habitat assessment and long-term population monitoring of murrelets.

### DISTRIBUTION OF XANTUS' MURRELET NESTING AREAS IN THE CALIFORNIA CHANNEL ISLANDS, BASED ON NOCTURNAL VOCAL DETECTION SURVEYS IN 1994-1996

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Past survey efforts in 1975-1977 and 1991 indicated that almost all Xantus' Murrelets (*Synthliboramphus hypoleucus scrippsi*) in the California Channel Islands nested at Santa Barbara Island, California, and Islas Los Coronados, Mexico. In 1994-1996, we conducted nocturnal vocal detection surveys at coastal stations around all 9 islands to better assess the relative importance of all potential nesting areas. Highest detections/station occurred at Santa Barbara and Los Coronados islands. At Anacapa Island (where near extirpation was suspected from rat predation), we found nests in sea caves and high detections/station, indicating a relatively large population. High or medium detections/station occurred at Santa Cruz and San Miguel islands, including known and newly-discovered nesting areas. Medium or low detections/station occurred at San Clemente and Santa Catalina islands, indicating newly-discovered nesting areas where only single nests had been found before. Newly-discovered nesting areas occurred in steep slopes, cliffs and sea caves (habitats not surveyed previously). No detections were noted at San Nicolas and Santa Rosa islands where little potential habitat existed.

### GUT PASSAGE TIME AND ENERGY ASSIMILATION EFFICIENCY IN CASPIAN TERN AND ELEGANT TERN CHICKS: DOES DIGESTION LIMIT FEEDING AND GROWTH?

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Gut passage time and energy assimilation efficiencies were compared for chicks of Caspian Terns and Elegant Terns nesting at the Bolsa Chica Ecological Reserve in southern California. We explored the possibility that the rate at which the chicks are fed by their parents is driven by the rate at which the chicks can process food and the efficiency with which they assimilate energy from this food. Based on observations of the frequencies with which adult pairs of Caspian Terns feed their 2-3 young and adult Elegant Terns feed their single young, we tested the hypothesis that Elegant Tern chicks have faster gut passage times but less efficient energy assimilation than Caspian Tern chicks. We fed a northern anchovy diet to 2-3 week old Caspian Tern and Elegant Tern chicks held individually in cages in a

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controlled environment room over a 19-33 day period. Carmine dye fed in gelatin capsules with the food appeared in the feces of Elegant Tern chicks significantly sooner (147 min) than that in Caspian Tern chicks (349 min). Acquisition and analysis of data on assimilation efficiencies, growth rates and maintenance rations of the captive chicks are in progress.

### NOCTURNAL FORAGING BY WESTERN GREBES: IS THERE A BIOLUMINATING MECHANISM?

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Western Grebes (*Aechmophorus occidentalis*) winter in the coastal marine waters of western North America. Grebes disperse from large roosting flocks at dusk and begin foraging after sunset. Observations during the night, using a night vision scope, confirm that grebes are solitary nocturnal foragers. Western Grebes feed on pelagic schooling fish, primarily herring (*Clupea harengus*). Current theories on why birds may forage in low light conditions suggest that the vertical migration of prey may offer energetic savings by reducing travel time during the dive. These explanations do not adequately address the problem of finding and capturing prey in near darkness. Daytime foraging birds, specializing on pelagic schooling fish, conduct feeding dives in a series of bouts. Most dives are "search dives" where the bird does not encounter fish. It is likely that as much as 80% of dives are search dives and can be considered an energetic cost of foraging. Although grebes will benefit from the vertical migration of prey, they may benefit more by not conducting "search" dives at night. I propose that bioluminescent trails of fleeing fish are the visual signal for night foraging Western Grebes which search for prey on the surface and do not dive until prey is sighted nearby.

### COMPARATIVE CHICK PROVISIONING IN CASPIAN TERNS AND ELEGANT TERNS AT THE BOLSA CHICA ECOLOGICAL RESERVE IN SOUTHERN CALIFORNIA

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Feeding frequency, prey type and prey size were recorded for Caspian Tern and Elegant Tern chicks as they were provisioned by their parents at the Bolsa Chica Ecological Reserve in coastal Orange County, California, to test the hypothesis that Elegant Terns, because of smaller body and clutch size and greater sociality, feed their chicks more frequently than Caspian Terns, whereas Caspian Tern chicks are fed greater biomass per day. Two groups each of Caspian Tern and Elegant Tern chicks were held in enclosures and observed for approximately 100 hours from a pair of blinds on the breeding island. We found that Caspian chicks were fed larger fish than Elegant chicks, whereas Elegant chicks were fed more individual fish per day than Caspian chicks. Results still being analyzed will provide estimated caloric intake per day for chicks of both species. With ongoing shifts in prey abundances and the suggestion that terns may be especially sensitive to fluctuations in food availability, information from this study will help predict the likelihood of foraging and reproductive success of these two species at Bolsa Chica and elsewhere.

### USE OF RADAR AS AN INVENTORY AND MONITORING TOOL FOR MARBLED MURRELETS IN WASHINGTON AND OREGON

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Concurrent radar and audio-visual observations of Marbled Murrelets were made in 4 drainages in the Olympic Peninsula and in 13 drainages along the Oregon Coast. Radar data suggest that the audio-visual technique is not suitable for estimating numbers of murrelets flying up and down drainages: 50 times more birds were detected on radar than audio-visually. Further, it appears that murrelets in Olympic Peninsula drainages were flying into nesting stands in substantial numbers before standard protocol surveys began: a consistent peak in inland-bound movements occurred approximately 40-80 minutes before sunrise, followed by a seaward exodus that ended approximately

1 hour after sunrise. In Oregon, however preliminary data indicate that inland-bound movements occurred later than at the Olympic Peninsula. Radar counts of murrelets increased steadily during the summer, with mean counts nearly tripling between May and July. Within a month, day-to-day variation in radar counts was relatively low (CV = 14-29%). Results of these pilot studies suggest that radar is a valuable tool for obtaining indices of abundance for Marbled Murrelets on a watershed scale and also shows great promise as a long-term monitoring tool for murrelets.

### VARIABLE TIME BUDGETS OF RHINOCEROS AUKLETS AT SEA OFF SOUTHWESTERN VANCOUVER ISLAND

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Time budgets of adult auklets were measured through visual scans during the 1996 breeding season, near Seabird Rocks. Objectives were to describe adult activities at sea during three breeding phases (incubation, chick rearing and post-fledging) and diurnally, as part of a project examining provisioning efforts in response to variations in prey density and distribution. The time spent foraging remained relatively constant through each phase but the degree of flocking varied. During chick rearing, adults dove a higher percentage of the time in mixed species feeding flocks. Increased flock foraging also coincided with the seasonal appearance of juvenile Pacific Herring in the study area. Thus the appearance of herring and/or the onset of chick rearing seemed to cause this increase in feeding flock use. The time spent foraging also increased from dawn to dusk during chick rearing, apparently due to increased diving to collect chick meals in the evening. Adults rarely foraged in flocks near dusk and adults carrying fish, potentially rearing chicks, were only seen to dive solitarily. Fish species and size collected at feeding flocks also differed from those collected in chick meals at the colony. This dichotomy suggests that adults selected different prey items when central-place foraging than when self-feeding.

### SYNOPSIS OF CEPHUS SYMPOSIUM AND DIRECTIONS FOR FUTURE RESEARCH

## ABSTRACTS

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The utility of guillemots as indicators depends on the variable that is being monitored and the availability of alternative methods of monitoring. Many factors that affect guillemot reproduction are best measured through direct means. While guillemots may at times provide the first evidence of a change in the nearshore environment, they typically will be most useful as evidence of biotic response to known change.

Several factors lessen the utility of guillemots as secondary indicators, and severely restrict them as primary indicators. Their ability to utilize a wide variety of fishes and invertebrates could render measures of breeding success insensitive to changes in the taxonomic composition (but not abundance) of nearshore prey. Colonies separated by as little as a few kilometers may have markedly different prey bases and associated reproductive traits. Sample sizes of accessible nests can be low, and may be further reduced by predation. Increasing population size and sample size of accessible nests by providing artificial nest sites works in some but not all cases. Physiological responses of nestlings to known doses of contaminants need to be measured in controlled, captive environments.

More effort should be expended to examine those aspects of guillemot biology best suited to monitor change in nearshore ecosystems, followed by development of baseline data in representative locations and habitats. By carefully selecting breeding populations to serve as indicators, valuable information can be obtained on the local status and trends of coastal habitats.

### BLACK GUILLEMOTS AS INDICATORS OF REGIONAL CLIMATE CHANGE IN ARCTIC ALASKA

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Models of global climate predict that polar regions will be among the first affected by temperature increases associated with greenhouse gases. Warming trends have already been recorded in parts of the

arctic, including northern Alaska. Studies of Black Guillemot breeding biology near Point Barrow, Alaska have revealed a substantial advancement of the breeding season over the last two decades. The median date of clutch initiation has advanced significantly (4.6 days per decade) from early July in the 1970's to late June in the 1990's. Both date of median clutch initiation and the date the first egg was laid in the colony were correlated with annual measures of snowmelt. Snow accumulation in and around the ground-level manmade nest sites prevent access to nesting cavities and the initiation of breeding. Meteorological records from Barrow indicate that date of spring snowmelt has been advancing for almost 50 years. The late snowmelt in the late 1940's and 1950's would have regularly delayed clutch initiation until mid-July, increasing the chances of chicks being trapped in nest sites by September snow storms. Black Guillemots require 65 days from egg laying to chick fledging and snowdrifts frequently form by the middle of September. The snow-free temporal window wide enough for successful breeding likely has occurred only in recent decades.

### CONSERVATION OF SEABIRDS: A DIFFICULT EDUCATIONAL TASK

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Unlike 100 years ago when protecting a seabird colony from human exploitation or other introduced predators was enough, today the effects may be direct (e.g., harvesting for consumption) or indirect (e.g., competition with fishing operations for food, incidental mortality in fishing nets, reproductive failure due to synthetic hormone mimics). The categories of threats to seabirds have changed over the last century. However, the most important changes are in the cumulative intensity and extent of the threats which have increased manifold resulting in measurable, region wide shifts in the composition and distribution of marine species. Furthermore, unlike historical disturbances which affected only reproductive individuals and their eggs confined to breeding colonies, current disturbances have the potential to affect all age-classes of seabirds, year-round, in all parts of the ocean. Despite growing emotional ties to seabirds

other larger factors continue to exert negative pressures. Rising human populations increase the demand for fish protein. The structure of the global economy significantly devalues the price of fish (a commodity) relative to the price of marketing fish (a service) because commodity prices have been allowed to ignore the costs imposed on linked species and systems. Legislation currently exists to protect many threatened seabirds, but until education increases awareness of the environmental costs of existing human institutions, legislation is not sufficient.

### CONSERVATION PROBLEMS AND OPPORTUNITIES IN THE LINE ISLANDS, CENTRAL PACIFIC OCEAN

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The Line islands extend from Palmyra Atoll, south of Hawaii and under United States jurisdiction, through the central Kiribati Republic Line Islands of Kiritimati (Christmas), Tabuaeran (Fanning), and Teraina (Washington). South of these populated islands are the dry and uninhabited central Pacific Line Islands of Malden and Starbuck, and the more southerly trio of the wetter atolls of Vostok, Flint, and Caroline, also controlled by the Republic of Kiribati. Most of the islands were mined for guano in the 19th and early 20th centuries, suggesting a long history of use by breeding seabirds. Christmas Island may be the world's largest tropical seabird colony, and is under severe pressure from and ever-increasing human population and resulting impacts. I visited most of these islands in September 1995, and found that feral cats and rats still occur on most if not all the islands. Although Christmas Island is worthy of any and all intense international conservation efforts, significant results may be more easily achieved by eradication of non-native predators from Malden, Starbuck, Vostok, Flint, and Caroline atolls. Palmyra contains one of the most important stands of native *Pisonia* forest under United States jurisdiction, and should be closely monitored to preserve this unique resource.

### SEASONAL AND SEX-BASED VARIATION IN THE ADRENOCORTICAL RESPONSE TO CAPTURE STRESS IN MAGELLANIC PENGUINS

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Secretion of adrenal corticosteroid hormones is a typical part of the response of most vertebrates to stressors, including capture and handling. However, the magnitude of the response varies considerably among species, and some species modulate the response at different times of year. In particular, species with tightly constrained breeding seasons, and those that breed in stressful environments (e.g., deserts) may significantly down-regulate their hormonal response to stressors. Magellanic Penguins are constrained as to timing of breeding, breed in the desert, and in addition, fast for up to 3½ weeks during incubation. I studied the response of breeding penguins to capture and handling across the course of the breeding season, and predicted that they would down-regulate corticosterone secretion during the prelaying and incubation periods. Animals were captured at their breeding colony at Punta Tombo, Chubut, Argentina, and held for 35 minutes, while a series of blood samples was collected for assay of corticosterone levels. Both sexes down-regulated the stress response during different breeding stages, but in an alternating fashion, and not as predicted. Strength of the response was most closely related to the body weight (i.e., condition) of the animal, with fat animals responding less than lean ones.

### PATTERNS OF PARENTAL CARE BY MALE AND FEMALE CRESTED AUKLETS AT BULDIR ISLAND, ALASKA

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Observers have noted enigmatic patterns of male and female chick provisioning by Crested Auklets (*Aethia cristatella*), which are monogamous sexually monomorphic seabirds with bi-parental care. In July 1996 we used radio telemetry to quantify attendance of both members of seven breeding pairs at a large auklet colony. Parents were captured within a few days after their chick hatched and were fitted with 1.6 g radio transmitters (0.6% of adult body mass) attached to a leg band. The birds' presence near their chicks was recorded by a scanning radio receiver linked to whip antennas in each crevice,

and the data was logged automatically every 3-4 minutes for at least 30 days. Diurnal brooding by males and females decreased from virtually continuous during the first four days after hatching to zero at day seven. Feeding visits occurred primarily during the two main activity periods (1000-1400h and 2200-2400h), although visits to the crevice occurred throughout the day and night. Chicks received about four feeds per day throughout their development. Male and female attendance patterns will be described. Chick growth at crevices with radio-equipped parents did not differ significantly from crevices with parents without radios.

### BLACK NODDY BEHAVIOR IN THE POST-FLEDGING PERIOD

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Post-fledging parental care of several months duration has been reported in many seabird species; however, the roles of the parents and offspring in maintaining this care are not often known. I observed parent-offspring interactions and patterns of attendance on the nest throughout the post-fledging feeding period (of up to four months) in color-banded Black Noddies on Tern Island and Laysan Island in the Northwestern Hawaiian Islands (NWHI), and on Heron Island in Australia. Individual variation among fledglings in begging intensity and persistence, sexual differences between parents in contribution to parental care, and differences among populations in the duration of the post-fledging feeding periods were examined. Black Noddies in the NWHI are resident year-round, have a protracted nesting season, and have high mate and nest-site fidelity. Also, about 40% of pairs on Tern Island double-brooded (fledged two successive broods within a nesting season). To preserve nest ownership for subsequent nesting, a pair must maintain its presence on the nest. Fledglings may take advantage of their parents continued presence on the nest by continuing their begging behavior. Evidence suggests that some parents may move to a new nest site to evade a persistently begging fledgling; however, fledglings also appear to be important in defending the nest from takeover.

### POSTNATAL ENERGETICS AND THE ONTOGENY OF THER-

### MOREGULATION FOR FOUR SPECIES OF ANTARCTIC FULMARINE PETREL

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We measured standard metabolic rate (SMR) of chicks and adults of four species of Antarctic fulmarine petrel: Snow Petrel (*Pagodroma nivea*), Cape Petrel (*Daption capense*), Antarctic Petrel (*Thalassoica antarctica*), and Southern Fulmar (*Fulmarus glacialisoides*). Body temperature ( $T_b$ ) of chicks increased sigmoidally with mass from hatching to 8-12 days of age;  $T_b$  peaked at 38.6 to 39.0°C. Young chicks were homeothermic: during metabolic studies,  $T_b$  of 3 and 8 day old chicks did not vary with air temperature (range 0 - 30°C;  $P = 0.94$ ). Lower critical temperature of chicks decreased from 15-22°C at 3 days of age to -4 to 8°C for 28 day old chicks, while that of adult birds was intermediate at 5-13°C. Mean SMR at thermoneutral for each of the four species was higher than predicted for nonpasserine birds, but similar to that predicted by Ellis (1984) for Charadriiformes breeding at similar latitudes. Resting metabolic rate accounted for 71-109% of the estimated total metabolic energy required to fledging for birds of this mass. The implications of these findings for life in the Antarctic will be discussed. (Supported by Australian Antarctic Division project No. 7020 and NSF grant OPP 92-18536).

### A TRANSECT METHOD TO QUANTIFY MARBLED MURRELET HABITAT QUALITY AND DESIGN LANDSCAPE CONSERVATION STRATEGIES

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Most studies examining Marbled Murrelet habitat use have measured forest characteristics using fixed or variable radius plots. However, such methods may have limited utility when small patches of suitable habitat exist in larger forested sites or scattered remnant trees are present. We developed a transect method that consists of a 10% or 100% cruise where observers traversed every acre of the stand to be sampled. Using this method, we sampled 21 occupied and 21 unoccupied stands representing 3,328 acres of poten-

tial marbled murrelet habitat on the Elliott State Forest in the Oregon Coast Range. We found the transect method adequately sampled heterogeneous habitats. Using this habitat data, a logistic regression model was developed that predicted stand occupancy with an overall accuracy rate of 76%. Since data was collected and collated for every acre sampled, detailed habitat maps showing the probability of occupancy of each acre could then be created for any area. These habitat maps accurately displayed information on the location, dispersion, and quality of the habitat sampled. This information can be used to develop long-term conservation and management strategies. Mapping habitat at larger scales would allow a landscape approach to the management and assessment of marbled murrelet habitat. This approach would be a powerful tool to help protect and conserve marbled murrelet nesting habitat over time.

#### FULMAR COLORS AND KITTIWAKE CLUTCHES: SHAMELESS SPECULATIONS REGARDING LONG-TERM CHANGE

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A hundred years ago, Red-legged Kittiwakes apparently were more widely distributed and numerous than they are today. On the Pribilof Islands, Elliott (1882) reported that Red-legs usually laid two eggs per clutch, and sometimes three. Today, multiple-egg clutches are so rare in this species that they are generally regarded as aberrations or of doubtful origin. Early accounts also suggest marked shifts in the proportions of different color phases of Northern Fulmars on the Pribilos and on Chagulak Island in the eastern Aleutians. What could account for such rapid shifts in fundamental demographic traits of organisms having generation times of 20-30 years? Kittiwakes and fulmars form a small foraging guild comprised of offshore surface feeders on fish and macrozooplankton. Overlap in the breeding distribution of fulmars and Red-legged Kittiwakes in the Bering Sea suggests close ecological affinities between these two species in particular. Both species forage heavily at night, although I suggest that dark-phase fulmars are better adapted for this than light-phase birds. I further suggest that an ocean regime shift occurred in the early 1900's favoring day-

time foragers over nighttime foragers at the Pribilof Islands and nighttime foragers over daytime foragers at Chagulak. In response, night-feeding Red-legged Kittiwakes reduced their clutches to one egg, whereas fulmars changed body color to the most appropriate plumage in each environment. Among other radical features, this hypothesis requires that fulmar phenotypes can change over the life of an individual.

#### DECLINE OF PIGEON GUILLEMOT POPULATIONS IN PRINCE WILLIAM SOUND, ALASKA, CHANGES IN CHICK DIET, AND INCREASED NEST PREDATION

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Pigeon Guillemots are cavity-nesting, pursuit-diving seabirds that forage in the nearshore environment on both demersal and schooling fish. Since the late 1970s and early 1980s there has been a dramatic change in the diet of Pigeon Guillemot chicks on Naked Island in Prince William Sound, Alaska. In the years 1979-1981 Pacific sand lance (*Ammodytes hexapterus*) were the single largest component (42%) of the diet, while in the five years 1989-1990 and 1994-1996, sand lance accounted for a much smaller fraction (13%) of the diet. The increase in the proportion of gadids has been equally dramatic, from 4% to 21% for these same periods. Demersal fish such as gunnels (Pholidae), pricklebacks (Stichaeidae), and sculpins (Cottidae) have always been an important component of the diet although their relative contribution has increased. Other schooling fish in the chick diet include herring and capelin, but their relative contributions have varied widely from year to year. The overall population of guillemots at Naked Island has decreased from over 2000 in the late 1970s to about 1200 in the 1990s. The decline in the guillemot population could be related to this apparent change in prey abundance, which may be a manifestation of a major shift in the marine ecosystem. Greatly increased rates of predation at the nest may also be affecting the numbers of guillemots, at least on Naked Island.

#### PIGEON GUILLEMOTS AS INDICATORS OF THE NEAR-SHORE ECOSYSTEM OF AN OFF-SHORE COLONY

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Pigeon Guillemots (*Cephus columba*) on Southeast Farallon Island, California, forage relatively close to the shores of the Farallones than other breeding seabird species on the island. This near-Farallones ecosystem includes coastal, slope and shelf habitats and creates a foraging area influenced by numerous oceanographic processes. Pigeon Guillemots exhibit intermediate responses to environmental variability which make it an ideal indicator species. We investigated relationships between oceanographic conditions (prey availability, SST, upwelling intensity) and breeding ecology (productivity, chick growth, chick diet). Reproductive parameters and chick diet showed marked annual variability and several long-term trends were identified. A general decrease in the use of juvenile rockfish and an increase in the use of cottids (sculpins) was observed, but reproductive success has remained relatively constant over the 25-year period.

#### FORAGING ECOLOGY OF ANTARCTIC FULMARINE PETRELS

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Diets of Snow, Cape, and Antarctic petrels and Antarctic Fulmars breeding on Hop Island, Prydz Bay, Antarctica were determined from stomach contents of adults returning to feed chicks in 1994-96. Diet composition was determined by quantitative analysis (weight, frequency of occurrence, and number of individuals) of stomach contents collected using the water offloading technique. Fish (mainly *Pleuragramma antarcticum*) occurred in 100% of samples from all four species. Krill, primarily *Euphausia superba*, occurred in 97.5%, 85%, 93.3%, and 62.5% of Snow, Cape, and Antarctic petrel and Antarctic Fulmar stomach samples, respectively. Few samples contained amphipods or squid. By weight, fish comprised 89.5%, 30.8%, 58.2%, and 64.4%, and krill 10.1%, 68.6%, 41.5%, and 35.7% of Snow Petrel, Cape Petrel, Antarctic Petrel and Antarctic Fulmar diets, respectively. Meal delivery rates (feeds/day) during peak chick growth were 0.41, 0.54, 1.03, and 1.33 for Antarctic Petrels, Snow Petrels, Antarctic

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Fulmars, and Cape Petrels, respectively. Diet composition and provisioning rates suggest that foraging ecologies of Snow and Antarctic petrels are similar, as are those of Cape Petrels and Antarctic Fulmars. Inter-annual comparisons of meal size, diet, and foraging trip length will be discussed. These data, when combined with energetics information, will better elucidate the ecological role of these petrels in the marine ecosystem.

### SEASONAL FORAGING ADJUSTMENTS IN PENGUIN PARENTS: QUALITY VS. QUANTITY

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In penguins, individuals' foraging decisions are restricted by the behavior of their mates: prior to leaving chicks unattended (i.e., creche phase), parents can go to sea only after being relieved at the nest. This temporal constraint often necessitates feeding at night when darkness may constrain visual hunting. We predicted that Chinstrap Penguin parents would respond to rising chick demands by: 1) avoiding nocturnal foraging once parents can forage independently, and 2) augmenting time at sea by increasing foraging frequency and/or duration. Radio telemetry revealed that diurnal and overnight trips were common during chick-brooding but overnight foraging declined rapidly following creche. Birds completed two diurnal trips per day more frequently after creche. Chick age and diurnal trip duration were positively correlated, but only after creche. Daily averages of diurnal trip durations fluctuated widely; opposite trends in two years indicated diurnal foraging is also strongly influenced by environmental factors. The onset of creche therefore marks a significant change in penguin feeding behavior: before, trip durations reflect largely less predictable environmental factors, whereas after -- with rising food requirements -- birds apparently enhance the quantity (frequency and duration) and quality (timing) of foraging.

### WILDLIFE AGENCY SPONSORED OILED WILDLIFE CARE: A PARADIGM SHIFT

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Although state wildlife agencies are the trustees for all wildlife resources, few provide care for wildlife compromised by oil spills. In 1990, California legislation established OSPR within the California DFG. This was accomplished by placing a \$.04/barrel fee on oil transported or processed in the state for various activities, including the care of oil-affected wildlife. This legislation calls for the establishment of rescue and rehabilitation station(s) and delivery of the "best achievable treatment" for oiled wildlife. Subsequent legislation (two actions) allowed OSPR about \$9 million interest from an Emergency Response Fund over a 4-year period, to establish an Oiled Wildlife Care Network (OWCN) for California. Care centers are being developed in conjunction with two universities, a marine park, and two wildlife rehabilitation/education programs. Each has varied sources of financial, political and personnel (volunteer) support, assuring that all centers will function in additional useful roles when not in use for oil spill response. The long-term functioning of OWCN, along with a competitive grants program for technology development and research, will be accomplished through the Wildlife Health Center at U.C. Davis. Current research projects aim to improve care and improve both short-term and long-term damage assessments. The OWCN is the first nonprofit partnership of its kind; it allows industry to efficiently meet some of its legal requirements and it obligates the public trustee agency to manage the entire process. OWCN also demonstrates a commitment to integrate wildlife care with resource management and research--it has broad public support.

### DISTRIBUTION AND ABUNDANCE OF KITTLITZ'S MURRELETS IN SOUTHCENTRAL AND SOUTHEASTERN ALASKA

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The Kittlitz's Murrelet (*Brachyramphus brevirostris*) is a rare seabird that predominantly ranges within Alaska. Little

data is available on its distribution and abundance. We conducted surveys to determine marine bird populations of three areas within the Kittlitz's Murrelet range: Lower Cook Inlet, Prince William Sound, and Southeastern Alaska. In summer, Kittlitz's Murrelets were primarily associated tidewater glaciers or recently deglaciated regions in Prince William Sound and Southeastern Alaska. In Prince William Sound, they also occurred in low densities away from glaciers. In Lower Cook Inlet, where there are no tidewater glaciers, Kittlitz's Murrelets were found in low densities throughout the area. Kittlitz's Murrelets were not observed during the winter in eastern Lower Cook Inlet. They occurred in Prince William Sound in the winter; however, their densities were lower than summer, and they had dispersed away from the glaciers. We calculated abundance estimates  $\pm$  95% CI as:  $3,353 \pm 1,718$  in Lower Cook Inlet summer;  $3,368 \pm 4,073$  in Prince William Sound summer;  $513 \pm 831$  in Prince William Sound winter; and  $5,408 \pm 7,039$  in Southeastern Alaska summer. The combined estimate for the three areas during summer was  $12,130 \pm 8,312$ . We compare distribution and abundance with historical observations.

### GEOGRAPHIC PATTERNS OF GENETIC DISTINCTNESS IN THE GUILLEMOTS

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Divergent populations are often the result of natural selection and/or genetic drift in ecologically marginal areas, and are thought to be major sites of speciation events. We surveyed neutral variation in the mitochondrial control region to reconstruct the global phylogeny of the seabird genus *Cephus*, and to survey population-level variation. Major lineage splitting seems concordant with glacial events in the Pleistocene epoch, while more recent divergence reflects population genetic processes. Spectacled and Pigeon guillemots are sister taxa, while Black Guillemots are most divergent. Subspecies of Black Guillemots vary in levels of genetic diversity, whereas subspecies of Pigeon Guillemots are genetically uniform, reflecting unique evolutionary histories of the subspecies. Our analysis identifies centres of genetic diversity and regions of genetic monomorphism, important both

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for understanding theoretical evolutionary genetics and for conservation planning.

### REINTRODUCTION OF ATLANTIC PUFFINS AT FORMER BREEDING SITES IN THE GULF OF MAINE

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To re-establish colonies of Atlantic Puffin to two historic nesting sites in the Gulf of Maine, northwest Atlantic, 1,904 puffin chicks were translocated from Great Island, Newfoundland to Eastern Egg Rock (EER) and Seal Island National Wildlife Refuge (SI) in Maine from 1973-1989. By 1989, 149 of 914 chicks fledged at EER were resighted at least once in the Gulf of Maine, 42 of which bred at EER. Five pairs nested at EER in 1981, and 15-19 pairs have nested each year from 1985 to 1996 without subsequent translocations. Of 912 fledglings released at SI, 155 were resighted at least once in the Gulf of Maine. Seven pairs recolonized SI in 1992 and the colony increased to 40 pairs by 1996. Decoys helped to attract puffins to both sites. The study shows that nestling Atlantic Puffins can be successfully translocated and that new, productive colonies can result. These benefits must be weighed against variable and sometimes low survival of chicks, labor-intensive and expensive technique and costs to the 'donor' puffin population at Great Island.

### PREDATION ON FISH BY CORMORANTS AND PELICANS IN A COLDWATER RIVER

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As populations of some fish-eating birds have increased, their predation on stocked fish has caused growing controversy. We studied the diets and total consumption of Double-crested Cormorants and American White Pelicans before and after fingerling trout were stocked in the North Platte River, Wyoming. For cormorants, suckers (*Catostomus* sp.) were the major prey before trout stocking (85% fresh mass of the diet); but trout consumed increased from an average 12% mass in sampling periods before stocking to 82% mass in

samples after stocking. Pelicans ate mainly suckers (84% mass) throughout the study period; trout were only 0.1% of the pelican diet before stocking, and an average 14% after stocking. A bioenergetics model estimated that pelicans and mainly cormorants consumed up to 80% of the mass of trout stocked in 1994. Peak consumption corresponded to maximum demand by cormorant chicks, which overlapped the typical dates of trout stocking. In August 1993, cormorants ate mostly trout (98% mass), indicating that many stocked trout survived through late summer. However, the much smaller fraction of trout in the cormorant diet in spring before stocking (13% mass) than after stocking (82%) suggested that stocked trout declined substantially during winter. Because overwinter survival might have limited trout recruitment between years, it is unclear whether bird predation was additive or compensatory.

### NESTS AND NESTING BEHAVIOUR OF MARBLED MURRELETS IN DESOLATION SOUND, BRITISH COLUMBIA

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Twenty-three nest trees of Marbled Murrelets were found in the Bunster Range (n=21) and the Brittain River watershed (n=2) on the Sunshine Coast of British Columbia in 1996. Nests were located using dawn surveys and tree climbing. The 23 trees were in late successional stands (>700 m in elevation) and contained a total of 30 nests: 5 nest trees each contained 2 nests and one tree had 3 nests. All nests were in trees > 62 cm in diameter and > 20 m in height. Nest tree species included Yellow Cedar (n=21), Western Hemlock (n=1) and Douglas Fir (n=1). Data were collected on nest site, tree and stand characteristics and will be analyzed to determine habitat selectivity. Observations of nesting behaviour include re-use of nest sites within and between years. Nesting success was low. Of 15 nests with known outcomes, 4 were successful. Evidence collected at nest sites indicates that predation on eggs (n=8) and adults (n=2) were causes of nest failure.

### SPATIAL DISTRIBUTION OF AND HABITAT SELECTION BY SEA-BIRDS AND WATERFOWL IN CEN-

### TRAL AND SOUTH SAN DIEGO BAY

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The seabird and waterfowl community of coastal southern California's San Diego Bay (Bay) is comprised of overwintering birds from temperate northern latitudes and breeding birds from tropical southern latitudes. The majority of these species utilize shallow water habitats in south and central Bay, and about a third are considered sensitive by federal and state governments. An intensive one year study of species richness, composition, relative abundance, spatial distribution, and habitat association across south and central Bay was conducted between April 1993 and 1994. Weekly surveys were conducted during four different two-hour survey time periods. Point locations of seabirds and waterfowl were recorded by boat using a modified version of the two receiving station, triangulation location method. Species, density, behavior, weather, number of water vessels, and time were recorded at each point location. Open water habitats were categorized by water depth and percent cover of eelgrass. Point locations and open water habitats were analyzed using Arc Info.(ver.7.04) on a Unix platform. A total cumulative count of 149,553 seabird and waterfowl point locations were recorded. Surf Scoter was the most abundant species with a cumulative count of 85,475, followed by lesser and greater scaup combined (14,169), Bufflehead (7,667), Brant (6,929), and Brown Pelican (3,577). Abundance of bottom feeders, including Surf Scoter, Scaup, Bufflehead, and Brant, was 53 % higher in south Bay compared to central Bay. Preliminary results from a habitat selection analysis using a chi-squared utilization test based on the Bonferroni inequality (Neu test) will be presented.

### RISKS OF MAMMALIAN NEST PREDATION TO MARBLED MURRELETS

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We simulated 304 Marbled Murrelet nests and monitored their fates during the breeding seasons of 1995 and 1996. Small mammals (flying squirrels, Douglas squirrels, Townsend chipmunks, and deer mice) disturbed 20.7% of the nests. Mammals were more likely to disturb nests containing visual and olfactory cues associated with the nestling stage (nests contained crudely preserved, dead domestic fowl chicks) than they were to disturb nests with inert artificial eggs. Laboratory experiments were conducted to investigate food preferences and predatory abilities of flying squirrels, Douglas squirrels, and deer mice (*Peromyscus oreas*). These experiments are ongoing, but initial results indicate: 1) Mice are unlikely to be important predators on murrelet nests because they only rarely open large, intact eggs (they readily scavenge slightly cracked eggs). 2) Douglas squirrels are unlikely to be important predators because they do not appear able to open large eggs and do not attack murrelet-sized chicks. 3) Flying squirrels are potential predators because they can attack and kill large nestlings (200g feral pigeon chicks). However, nestlings are not preferred prey items and may only be killed when squirrels are hungry and preferred foods are in short supply.

### BREEDING BIOLOGY OF BRANDT'S CORMORANTS AT SAN NICOLAS ISLAND, CALIFORNIA

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Population size (1991-1995) and reproductive success (1992-1994) of Brandt's Cormorants (*Phalacrocorax penicillatus*) were studied at San Nicolas Island, California. San Nicolas Island is an active U.S. Navy base and currently hosts the largest Brandt's Cormorant colony in the Channel Islands. Breeding parameters varied annually due to a variety of factors. Breeding population size was highest in 1991 and 1993 and lowest in 1992 and

1995. Hatching, fledging and overall breeding success were depressed in 1992 due to human disturbance and intense El Niño conditions. Breeding success in 1993 was zero at monitored colonies due to predation by Island Fox (*Urocyon littoralis*) and possibly other factors, although successful renesting occurred very late at a new site. Reproductive success was highest in 1994 when human disturbance, predation, and El Niño were reduced. Overall, populations declined from 1991-1995 despite substantial increases since the 1970s. Colony-site switching was observed both within and between years and in some cases occurred after breeding failure. This switching behavior has occurred for several decades.

### IMPACTS TO NESTING XANTUS' MURRELETS BY INTRODUCED MAMMALS

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Xantus' Murrelets are one of the rarest breeding seabirds in the North Pacific, with breeding colonies distributed only from southern California, U.S.A. to central Baja California, Mexico. Among the many threats, predation by introduced mammals has had the greatest impact on populations. Feral cats have been introduced on at least 13 known nesting islands, beginning in the late 1800s to early 1900s. Cats are believed to have exterminated (e.g., Todos Santos, San Geronimo, San Martin islands) or severely reduced several Xantus' Murrelet colonies, especially in Baja California. Cats probably depleted the now large colony at Santa Barbara Island before being eradicated in the mid-1900s. Black Rats (*Rattus rattus*) impact murrelets on Anacapa Island and probably other colonies. Goats and other feral grazers have eliminated potential shrub-nesting habitat on several islands. Feral rabbits currently occur on at least two islands (and formerly one other) and probably destroy habitat and compete for nest sites. Increased human use of many islands may result in future introductions and impacts from human disturbance.

Much additional information is needed to determine the distribution of active colonies, population size, and the true extent of these impacts including assessments of supposedly extirpated colonies. Intro-

duced mammals should be eradicated from nesting islands.

### NESTING OF ASHY STORM-PETRELS IN SEA CAVES AT SANTA CRUZ ISLAND, CALIFORNIA

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In 1995-1996, we located and monitored nests of Ashy Storm-Petrels (*Oceanodroma homochroa*) at Santa Cruz Island, California. Four of five study colonies were discovered recently in sea caves, a nesting habitat previously not well documented. Colonies were visited at three to four week intervals, from late April until late November. All nest sites were marked with metal tags. Adults were not handled in order to minimize disturbance. Accessible chicks were weighed, measured and banded. Egg laying extended from April to September, with peaks in June and July. Fledging began in August and continued beyond the study period, probably into January. To describe breeding phenology, egg laying and hatching dates were back-calculated using available literature and estimated ages of chicks when first noted. A variety of nest sites were used, ranging from crevices formed by rock and/or driftwood to relatively open sites on cave floors. These nest sites are fragile and require protection from human impacts. Storm-petrels nesting in sea caves are susceptible to human disturbance by noise and death/injury due to trampling during sea cave visits.

### REDUCING SEABIRD BYCATCH IN SALMON DRIFT GILLNETS

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We compared seabird entanglement and salmon catch rates in modified gillnets across times of day (morning change of light, daytime and evening change of light) in an attempt to develop fishing gear and techniques that reduce seabird bycatch in salmon drift gillnets without significantly reducing salmon catch. Modified gear included monofilament gillnets with visible barriers of white opaque mesh

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replacing the upper 20 or 50 meshes of a traditional 200 mesh monofilament net and traditional monofilament nets equipped with acoustic alerts (pingers). Tests took place in the San Juan Islands area of North Puget Sound from 28 July to 29 August 1996. Preliminary data analyses indicate that seabird entanglement rates by gear type and time of day were species specific. Common Murre entanglement rates were similar (55.0% and 61.0% of control) in nets with 20 mesh and 50 mesh visual barriers, but Rhinoceros Auklet entanglement rates decreased with increasing depth of visual barriers, 57.9% and 21.8%, respectively. Pinger nets were more effective at reducing Common Murre entanglement rates (51.0% relative to the control) than Rhinoceros Auklet entanglement rates (80.7% of control). Common Murre entanglement rates were 2.3 and 2.2 times greater in morning and evening change of light sets than in daytime sets. Rhinoceros Auklet entanglement rates were 4.2 times greater in morning change of light sets than in daytime or evening change of light sets. Applications of these findings to fisheries management, and further development of acoustic technology to reduce seabird entanglements, will be discussed.

### ASSESSMENT OF IMPLANTABLE SATELLITE TRANSMITTERS FOR COMMON AND THICK-BILLED MURRES

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From 1995-96 we implanted 46 Common and Thick-billed murres with satellite transmitters, documenting over 3000 locations. Location accuracy averaged  $0.77 \pm 0.93$  (s.d.) km from the estimated source, with 77% of the locations within 1 km. For each satellite pass, we averaged a 60-77% chance of receiving a signal and a 43-51% chance of obtaining a usable location from each transmitter. Of all locations received, about 22% were erroneous and had to be culled from the database. Information from this method revealed foraging ranges, consistent feeding areas, and migration routes. However, implantation increased mortality and affected the nesting behavior of the birds. After implantation in 1996, we compared presence at the colony, time spent at the colony, and nesting status between implanted mur-

res and a control group. We found that implanted murres were much less likely to return to the colony, and that those that did return were less likely to breed successfully.

### WATERBIRD SPECIES RICHNESS, DIVERSITY, AND HABITAT USE IN SAN DIEGO BAY

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Intensive waterbird surveys of San Diego Bay were conducted in 1993 and 1994. The bay was partitioned into three subareas: North, Central, and South Bay. A total of 60 species and over 343,500 individuals were recorded during all 142 surveys within the bay. Distinct differences in waterbird species composition, abundance, and habitat use were detected between subareas. Dominate species guilds were pelicaniform and larid species in North Bay; Surf Scoter, scaup, larids, and brant in Central Bay; and Surf Scoter, brant, and larid species in South Bay. The trend of indices of waterbird species evenness, richness, and diversity was generally North>Central>South. Each subarea supported substantial numbers of sensitive species, particularly in North Bay, which is dominated by man-modified/developed areas. The presence of bait barges, sheltered marinas, and piers with restricted human access in North Bay provided significant roosting and foraging habitat for many species, such as Brown Pelican. These structural characteristics are mostly lacking in the Central and South bay subareas, which are dominated by extensive areas of open shallow water habitats preferred by scoters, scaups and brant. Foraging guilds showed strong preferences for certain habitats types, with a general tendency for shallow water habitats being preferred over deeper water habitats.

### EVALUATION OF THE EXTENT AND DURATION OF ALTERATIONS IN HEMATOLOGICAL AND SERUM BIOCHEMICAL PARAMETERS RESULTING FROM OIL EXPOSURE AND REHABILITATION

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Please refer to Anderson, D.W., et. al., Experimental Releases Of... for the study design.

In order to determine long term physiological effects of oil exposure and rehabilitation on avian species, 22 hematological parameters and 23 serum biochemical parameters for both rehabilitated (RHB) birds and control (CON) birds were examined at monthly intervals (April, May, June and July) after the Unocal-Metrolink oil spill (February 21, 1995). Analysis of variance was used to identify blood parameters which differed significantly ( $p < 0.05$ ) between the RHB birds and CON birds. The majority of significant differences between RHB and CON birds occurred in April (less than 2 months after the spill) including: white blood cell count (WBC), mean corpuscular hemoglobin and mean corpuscular hemoglobin concentration, creatine kinase (CK), alkaline phosphatase, aspartate aminotransferase, alanine aminotransferase, calcium, total protein, globulin, and albumin:globulin (A:G) ratio. Values from RHB birds were lower than CON birds with the exception of WBC, A:G ratio and calcium concentration. Creatine kinase concentrations significantly differed ( $p < 0.05$ ) in both April (CON>RHB) and July (RHB>CON). Abnormalities associated with liver enzymes, muscle enzymes, immunocompetence and red blood cells consist of the main alterations detected in this study. The biological significance of these results and their predictive value as it relates to long term post-release survival will be presented.

### UTILIZATION OF BLOOD SAMPLING TO EXAMINE THE STRESS RESPONSE OF XANTUS' MURRELETS (*Synthliboramphus hypoleucus*) TO THREE DIFFERENT HANDLING PROTOCOLS

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Blood samples were collected from 108 Xantus' Murrelets captured on the water near Santa Barbara Island, California at night. Birds were transported to the research vessel and randomly assigned to one of three study groups. Group 1 murrelets were held in pet carrier boxes for 30 minutes, removed and bled. Group 2 murrelets were removed from boxes at 20 minutes post capture, measured and bled at 30 minutes. Group 3 murrelets were bled immediately upon arrival to the research vessel (within 10 minutes post capture). Blood samples were analyzed for stress indicators.

There were no significant differences between study groups for white blood cell counts or white blood cell estimates, lymphocyte, monocyte and eosinophil counts, packed cell volume or total protein. Corticosterone concentrations, heterophil counts, basophil counts and heterophil:lymphocyte ratios all showed significant differences ( $p < 0.05$ ) between study groups. For all parameters, Group 2 murrelets had the highest concentrations while Group 3 murrelets had the lowest concentrations with the exception of heterophils where group 1 had the lowest counts. Preliminary results suggest that wild murrelets are stressed with being captured, but it appears that the level of stress is not affected by an additional 10 minutes of handling. More work is necessary to determine if this "stress" has an affect on survivorship of murrelets.

### POPULATION VIABILITY ANALYSIS OF THE ASHY STORM-PETREL (*Oceanodroma homochroa*) ON SOUTHEAST FARALLON ISLAND: STATUS, TRENDS, AND THE IMPACT OF PREDATION

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The Ashy Storm-Petrel is a rare species (<10,000 individuals world-wide), whose population is concentrated on Southeast Farallon Island (50 to 70% of the world population). It is currently a federally

designated Species of Concern. To assess its current status and future prospects, and to help design conservation and management plans, we carried out population viability analyses (PVAs) of the Southeast Farallon Island (SEFI) population based on empirical studies of this population, dating back to 1971. Earlier work (Sydeman et al. 1996) had determined that the breeding population in the main study area had declined 44% over a 20 yr period (1972 to 1992), this is equivalent to a constant 2.84% decline per year. We integrated published information, results from other species, and results of field studies on this population, to develop stochastic population models that reproduced the observed rate of decline. Field estimates of predation by Western Gulls on adults indicate mortality rates of 2.54%. If all such predation mortality were eliminated the population would be stable ( $\lambda = 1.00$ ). Thus, elimination of gull predation is the key to population stabilization. We estimate that the total population of Ashy Storm-Petrels on SEFI in summer 1996 is about 3900 to 4900 individuals (aged 1 year or older); of these, about 2000 to 2800 are breeders.

### RANDOMIZATION EVALUATIONS OF RADIO TELEMETRY AND STRIP TRANSECT METHODS OF SAMPLING HABITAT SELECTION BY BLACK-LEGGED KITTIWAKES

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We compared strip transect and telemetry methods of determining habitat selection by Black-legged Kittiwakes (*Rissa tridactyla*) in Prince William Sound, Alaska using randomization tests. The variables compared were distance birds were observed from shore and from their colony. We also used randomization tests to determine the effect of reducing our sampling effort for both methods. We evaluated factors that could bias either method and how they may affect the respective data sets. Telemetry data yielded

significantly greater values for distance from shore measurements. We concluded that our assumptions of linear flight between telemetry locations had biased our results. Distance from colony values determined by telemetry were significantly greater than those obtained from strip transects indicating a decreasing probability of sighting birds at increasing distance from their colony had biased the strip transect data. We modeled declining probability of sighting birds at increasing distance from colony and compared model predictions to field data. The field data was consistently equal to or below the model predictions. We concluded that telemetry provided a more representative measure of foraging distance than strip transects for colonial birds. Strip transect data had lower standard error values and our sampling effort could be greatly reduced and yield greater precision than the telemetry study. We concluded that greater precision could be obtained by using strip transect data for similar time investments.

### RESTORATION OF COMMON MURRE COLONIES IN CENTRAL CALIFORNIA: FIRST YEAR'S EFFORTS RESULT IN EGGS AND FLEDGED CHICKS

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Efforts to restore the Common Murre (*Uria aalge*) colony at Devil's Slide Rock in central California were initiated in January 1996. Murre decoys (384 adult, 36 chick, and 48 egg), mirror boxes, and a sound system were deployed as elements of a social attraction effort to encourage Common Murres to recolonize Devil's Slide Rock. Less than 24 hours after decoy deployment one murre was observed visiting the former colony and 4 murres were present within 48 hours. Thereafter, attendance was constant and murre numbers increased throughout the season. A peak count of 29 murres occurred on 12

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July. Six pairs of murres nested and 3 chicks successfully fledged. This is the first known breeding at Devil's Slide Rock in the last decade and is the first documented breeding in response to social attraction for murres in North America. We describe methods of artificial colony design, discuss aspects of social attraction, and compare attendance and breeding information collected at 3 other central California colonies.

### SEARCHING FOR DINNER: ROAD-SIGNS, RESTAURANT REVIEWS, AND RELATIVE ABILITY

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During the chick-rearing period, seabirds are especially dependent on marine productivity, as they must feed both themselves and their chick(s). In inherently variable environments, such as the near-shore oceanic system, seabirds make use of a variety of cues to find food including oceanographic structures such as localized upwelling, surface slicks, and Langmuir troughs, as well as social mechanisms such as passive and active information transfer, and group foraging. This paper explores the links between Common Murres (*Uria aalge*) and their prey base, in the waters immediately surrounding the largest breeding colony in Washington State, Tatoosh Island. Murre distribution around Tatoosh is a function of both distance from the island (i.e. diffusion) as well as nekton density - a pattern also displayed by other Alcids breeding on the island. On the colony, murres feed their chicks a range of prey items, mostly schooling baitfish. Prey species selection appears to be in part individual-specific, although there are also significant influences of day, time of day, and selection by neighbors. Taken together, these data suggest that murres combine social skills with use of specific oceanographic features to locate food in a spatio-temporally patchy environment.

### FEEDING ECOLOGY OF THE DARK-RUMPED PETREL IN THE EASTERN PACIFIC: TWO PERSPECTIVES AS DIFFERENT AS NIGHT AND DAY

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We collected information on the feeding ecology of Dark-rumped Petrel (*Pterodroma phaeopygia*) from 1913 sightings (2468 petrels) made during 24 research cruises (1976-1993). Most Dark-rumped Petrels (72%, 1783 petrels) were lone individuals which were not obviously involved in active feeding. In contrast to lone birds, most petrels recorded in groups were feeding (61%, 57 groups). Although we occasionally observed petrels scavenging at the surface, the vast majority of these feeding birds (93%, 53 groups) were in mixed-species flocks feeding on live prey. Flocks averaged  $70 \pm 17$  birds and  $4 \pm 0.3$  species, and were associated with subsurface predators on at least 28 occasions (53% of all feeding groups). The associated predators were tuna (minimum of 13 flocks), dolphins (21 flocks), and mixed schools of both (6 flocks).

Because hatchlings on Galápagos colonies are fed mesopelagic prey, Imber et al. (1992) understandably concluded that the Dark-rumped Petrel is a nocturnal feeder. Our research from ships at sea indicates that diurnal feeding is common and that this species is a member of the speciose seabird community that feeds in flocks and depends upon subsurface predators for feeding opportunities.

### EVALUATION OF PIGEON GUILLEMOT NESTLINGS AS SENTINELS OF NEARSHORE OIL POLLUTION: RESULTS OF A CONTROLLED DOSE-RESPONSE EXPERIMENT

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Pigeon Guillemot nests in Kachemak Bay, Alaska were monitored during the 1994 and 1995 breeding seasons. Growth rates were measured and blood samples were collected from nestlings at 20, 25, and 30 days post-hatch. Baseline levels of various blood biomarkers were influenced by year, Julian date, location, and age. In 1995, a controlled dose-response experiment was conducted by feeding small amounts (0.05 ml or 0.20 ml) of weathered Prudhoe Bay Crude Oil to nestlings at 20 and 25 days post-hatch. Serum levels of haptoglobin, total protein, sodium,

alanine aminotransferase (ALT), and aspartate aminotransferase (AST) were determined, as well as subsequent growth rates of body mass. No treatment effect was detected for total protein, sodium, ALT, and AST levels in sera, and growth in body mass was not different among treatments. Levels of haptoglobin differed among treatments, but there were significant location and provisioning rate effects that confounded treatment effects. These results suggest that doses were not sufficient to induce a persistent inflammatory response. Although more work needs to be conducted to assess its utility, haptoglobin may be a useful avian biomarker of recent exposure to anthropogenic contaminants.

### GROWTH OF PIGEON GUILLEMOTS AS AN INDICATOR OF FORAGE FISH QUALITY AND AVAILABILITY

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Pigeon Guillemots appear to provision nestlings opportunistically from available nearshore demersal and schooling forage fishes. Because these fishes vary in availability, size, and energy density, growth of Pigeon Guillemot nestlings may serve as an indicator of nearshore conditions. Aspects of guillemot diet were measured in Kachemak Bay, Alaska during the 1994 and 1995 breeding seasons. Taxonomic composition of diet and prey delivery rates to nestlings varied widely among breeding sites; proportion of sand lance (*Ammodytes hexapterus*) in diets varied from 2 to 86%. Prey delivery rates were influenced by location, tide stage, brood size, brood age, and a brood size location interaction. Growth rates increased with proportion of sand lance in the diet, but not with prey delivery rates. This suggests that availability of schooling forage fishes with high lipid content (e.g., sand lance, herring) may have a significant influence on guillemot productivity. Comparisons with guillemots breeding on Naked and Jackpot islands, Prince William Sound support this inference. Growth rates at Jackpot Island were higher than at Naked Island, especially in a year when herring

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was a major component of the diet. Diets at Naked Island were mostly blennies, with few sand lance or herring.

### WITHIN-SEASON CHANGES IN DENSITY OF MARBLED MURRELETS OFFSHORE OF THE SAN JUAN ISLANDS, WASHINGTON

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We surveyed for Marbled Murrelets from small boats using 16 line transects located 300 m offshore of 8 islands in the San Juan Archipelago of Washington. Transects, which totaled 170 km, were repeated during 7 10-day intervals beginning 24 June and ending 31 August, 1996. We estimated distance to each bird or group of birds and used program DISTANCE to calculate detection functions and density estimates for each sample period. Density varied from 6.6 to 7.3 birds/km<sup>2</sup> in periods 1 to 3 and increased to 16.2 to 19.3 birds/km<sup>2</sup> in periods 5 to 7. Assuming a closed population, these results are consistent with expected trends: numbers of adults were augmented by fledged juveniles as the breeding season progressed. We do not know whether the population is closed, as new adults may be immigrating from outside our study area. Further work to correlate density in our area to that in surrounding areas, along with independent estimates of juvenile productivity, will help test this assumption.

### INTRODUCTION AND OVERVIEW OF *CEPPHUS* SYMPOSIUM

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Guillemots (*Cephus* sp.) may be well-suited as avian bioindicators of the status of coastal ecosystems. This symposium explores the potential for using nesting guillemots to monitor variation

and perturbations in nearshore ecosystems, including annual variability in demersal and forage fish resources, presence and levels of contaminants, regional oceanographic and climate change, and other factors affecting the status of nearshore ecosystems. The following traits enhance guillemots as potential indicators: (1) most neritic members of the marine bird family Alcidae; (2) common, widespread, and homogeneous seabird genus; (3) nest in small, widely-scattered colonies; (4) frequently nest site-limited but plastic to nest site requirements, allowing for the expansion or creation of study colonies by providing artificial nest sites; (5) adults typically have high annual survivorship and high nest site fidelity, allowing both long term monitoring and an indicator of winter conditions in the nearshore; (6) raise one- or two-chick broods that are fed almost entirely on fish and remain in the nest cavity until adult size; (7)

provision young with whole fish carried in the bill so prey items can be identified, measured, and, if necessary, collected for contaminant analyses; (8) forage mostly within 5 km of the nest site in subtidal and nearshore zones; (9) prey opportunistically on a diverse assortment of subtidal and nearshore demersal fishes (blennies, sculpins), as well as schooling forage fishes (sandlance, herring, pollock, arctic cod).

### BEACHED BIRD AND MAMMAL SURVEYS ALONG THE CENTRAL CALIFORNIA COAST

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In 1993, the Gulf of the Farallones National Marine Sanctuary began Beach Watch, a long term monitoring program documenting numbers of live and beached (dead) birds and mammals, oil and tar ball deposition, and human activities along coastal beaches. Currently, surveys of 58 beach segments are conducted every two or four weeks, from Bodega Head, Sonoma County to Point Año Nuevo, San Mateo County. Beach Watch is designed to be a pre-spill baseline monitoring project, after Carter and Page (1989) post-oil spill survey program. Data on beached birds and mammals, from 12 beach segments with the longest coverage (October

1993 - June 1996), are presented. Forty-nine bird and eight mammal species were documented. Average annual deposition rate of birds during the winter (December - February) was 0.76 birds/km and 0.09 mammals/km; spring (March - May) 0.78 birds/km and 0.11 mammals/km; summer (June - August) 0.89 birds/km and 0.08 mammals/km; fall (September - November) 1.17 birds/km and 0.22 mammals/km.

### OILED BIRD AND TAR BALL DEPOSITION RATES FOR THE CENTRAL CALIFORNIA COAST

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In 1993, the Gulf of the Farallones National Marine Sanctuary began Beach Watch, a long term monitoring program of live and beached (dead) birds and mammals, oil and tar ball deposition, and human activities. Beach Watch is designed to be a pre-spill baseline monitoring project. Shipping lanes for a major west coast sea port for oil tankers (San Francisco Bay) run through the center of the survey area. Beach habitats varied and included sandy dune, creek mouths, and sandy coves along headlands and cliffs. Data from 12 beach segments (25.5 km) with the longest coverage (October 1993 - June 1996), are presented. Of the 49 beached bird species found during the study period, five were found oiled: Cassin's Auks, Common Murre, Northern Fulmar, Pacific Loon and Pink-footed Shearwater. One gull species and one shorebird species were also found oiled. Percent of beached birds which were found to be oiled was 2.2%. Tar ball deposition concentrated in two areas, Drake's Beach and Limantour Beach, with 1.05 tar balls/km and 1.81 tar balls/km, respectively. Oiled beached bird deposition did not correlate with tar ball deposition zones.

### USING ARTIFICIAL NEST BOXES TO STUDY BONIN PETREL BREEDING BIOLOGY

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Artificial nest boxes were used to study Bonin Petrels on Sand Island, Midway Atoll from 1994 -1996. Nest boxes consisted of a plywood box with a cover that opens like a trap door. PVC pipe, cut to 0.5, 1.5 or 2.0 m, was used as a tunnel for

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each box. I monitored boxes daily from January through June 1994, 1995 and 1996 to monitor incubation shifts, feeding frequency, chick growth, mate and nest site fidelity. During all three years, nesting birds used 15 of 30 boxes, 6 of which were single birds incubating eggs. Three pairs of birds returned to nest in the same nest box for three consecutive years, and one pair for two consecutive years. One pair bred in the same box in 1994 and 1996 only. Mean incubation shift was 7.07 days (range: 1-14 days). Average shift by females was 6.2 days (range: 1-12 days) and males 8.11 days (range: 1-14 days). Mean feeding frequency was one feeding every 1.93 nights. Mean maximal mass was 282.4 g and occurred in 67 day old chicks, after which, mean chick mass declined until fledging. Fledging occurred at a mean age of 83.8 days and at a mean mass of 187.8 grams.

### MORTALITY OF LAYSAN AND BLACK-FOOTED ALBATROSSES IN THE HAWAII PELAGIC LONGLINE FISHERY

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Laysan and Black-footed albatrosses are being killed during interactions with longline gear of boats fishing for tuna and swordfish in the central North Pacific at rates comparable to or exceeding hooking rates for seabirds on longlines in the southern ocean. National Marine Fisheries Service observers recorded interactions of marine mammals, turtles, and birds on 4% of the longline fishing trips taken by boats registered in Hawaii in 1994 and 1995. Laysan Albatross were hooked at a rate of 0.113 birds per 1000 hooks and Black-footed Albatross at a rate of 0.152 birds per 1000 hooks. Estimates ( $\pm 95\% \text{C.I.}$ ) of total take made using a design stratified by fish target species were  $1020 \pm 639$  Laysans taken in 1994 and  $1942 \pm 2435$  taken in 1995. We estimate that  $2135 \pm 970$  Blackfoots were hooked in 1994 and  $1796 \pm 1498$  in 1995. Numbers of northern hemisphere albatrosses being killed in this fishery are part of the overall mortality due to pelagic longlining by other nations and demersal longlining in Alaska. Estimates of mortality for Black-footed Alba-

trosses (world population = 58,500 breeding pairs) have triggered concern in the managing agencies and the Fishery Management Council.

### A COMPARISON OF THE BREEDING BIOLOGY OF THE THREE CEPPHUS SPECIES

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The two common species of guillemot, the Black Guillemot (*Cephus grylle*) and Pigeon Guillemot (*C. columba*), are believed to be similar in many aspects of their breeding biology and demographics. Although separated for 2.8 mybp (V. Friesen unpubl. data) they remain remarkably similar, due in part to maintaining generalist strategies. Only recently have studies been conducted on the breeding biology of their congener, the Spectacled Guillemot (*C. carbo*), restricted in its distribution to the Sea of Okhotsk. While scientists have generally assumed that information on one species can be applied to the entire genus, until now data on the breeding biology of the Spectacled Guillemot were insufficient to allow validation of comparisons. Using data from our recent studies of all three species, we compare their breeding biology to determine the similarity of the Spectacled Guillemot to its congeners. Examination of breeding chronology, egg size, clutch size, incubation and nestling period, fledgling mass (percent of adult mass), nestling diet, growth rates, and impacts of predation show differences among the three species are small or undetectable in our study populations. Differences that do exist may best be explained by differences in adult size, nesting habitat, and prey type and abundance.

### DOVEKIE, A PROBABLE BREEDER ON SAINT LAWRENCE ISLAND, ALASKA

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The breeding range of the Dovekie (*Alle alle*) is restricted to the high-arctic marine zone with principal colonies located in the North Atlantic. The total breeding population is estimated at 12 million (range: 8-18 million). In contrast, only a few observation records exist for the Bering Sea. A seabird survey along the north shore of

Saint Lawrence Island was conducted from June 28 to August 5, 1996. One Dovekie pair was observed for 1.25 hours on 27 July at Singikpo Cape auklet colony. The probable nest site was a talus slope 1.4 kilometers inland at 145 meters elevation. While I photographed, the pair repeatedly flushed, circled and returned to the site. I will present a video and slides that document behavior and habitat.

### FORAGING OF MALE MAGELLANIC PENGUINS DURING INCUBATION AND CHICK REARING: NEW RESULTS USING SATELLITE TELEMETRY

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We used satellite telemetry to determine foraging locations and behaviors of two male Magellanic Penguins breeding at Punta Tombo, Argentina. Both birds were experienced breeders--both banded as breeders more than 10 years prior to this study--and both had eggs or chicks in their nests during the study. One male swam to a location more than 500 km NE of the breeding colony during a 26 day foraging trip. The second male, which we monitored from the time of the first male's second trip, swam over 150 km to the ENE on a nine day foraging trip. This male also followed its first route on a subsequent shorter trip. In addition to foraging in different locations, the males exhibited different foraging patterns. During the period when the first male took one 18 day foraging trip, the second took six trips averaging 3.7 days in length. Furthermore, although most dives of both birds were very shallow (<=10 m), the remaining dives of the first male were spread approximately equally across depths of 10-20, 20-40, and 40-80 m, while the dives of the second bird were concentrated at depths greater than 40 m. These results, although preliminary, suggest that Magellanic Penguins forage farther from breeding colonies than was previously suspected and that individuals follow particular foraging strategies.

### POPULATION DYNAMICS OF KITTIWAKES IN PRINCE WILLIAM SOUND, ALASKA: DO CHANGES IN PRODUCTIVITY AT INDIVIDUAL

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### COLONIES SUPPORT OVERALL POPULATION TRENDS?

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The nesting population of the Black-legged Kittiwake (*Rissa tridactyla*) in Prince William Sound (PWS) has remained relatively stable from 1972 to 1989. From 1989 to 1995 the nesting population increased, although productivity significantly decreased compared with 1984 to 1989. Abundance of breeding pairs at individual colonies ( $n = 27$ ) within PWS, however, has undergone drastic fluctuations. Numbers of nests built at 15 colonies decreased by 7.1% to 100% (Boswell Rocks colony decreased from 4936 to 933 pairs). In contrast, 12 colonies increased by 40.3% to 3775% (Shoup Bay colony increased from 195 to 5628 pairs). Annual increases at some colonies were due to immigration and could not have been supported by recruitment from that colony (e.g. Seal Island had a maximum of 67 pairs prior to 1995 and 252 pairs in 1995). Conversely, some colonies declined at rates that may not be explained by adult mortality alone, indicating emigration. Further analyses of these data will assist in determining the extent of immigration and emigration among colonies and if productivity within PWS is sufficient to maintain population trends.

### WHAT IS KNOWN AND UNKNOWN ABOUT THE POPULATION DYNAMICS OF XANTUS' MURRELETS ON SANTA BARBARA ISLAND, CALIFORNIA: THE MOUSE FACTOR

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We developed a stochastic population dynamics model and viability assessment based on known and estimated demographic characteristics to evaluate the causes of apparent population decline of Xantus' Murrelets on Santa Barbara Island, California. Based on surveys by Hunt et al. (1979) and Carter et al. (1992), we established 3 scenarios in which the population declined by as little as 29.9% or by as much as 71.8% over the period 1977-1991 (i.e.,  $=0.975$ ,  $=0.947$ , and

$=0.914$ , respectively). Empirical studies conducted by the CINP Seabird Monitoring Program from 1983-1995 on reproductive performance indicated substantial inter-annual variability in hatching success (13 year mean=0.813), determined primarily by mouse (*Peromyscus maniculatus*) predation on eggs. We estimated the population trajectory, time to population halving, and probability of the breeding population reaching 500 breeding individuals (i.e., a critical level of endangerment or "quasi-extinction") using program RAMAS/METAPOP. Assuming  $=0.975$  (Scenario I), within 10 years there was <20% chance of the population halving and 0-6% chance of the population reaching "quasi-extinction"; within 20 years the probability of "quasi-extinction" increased to 24-28%. Assuming  $=0.947$  (Scenario II), within 20 years the probability of "quasi-extinction" increased to >70%, indicating a grave situation. Mouse predation would need to be reduced by 26% or 61%, respectively, to achieve population stability under Scenarios I and II.

### RECENT COMMON MURRE (*Uria aalge*) POPULATION TRENDS BASED ON DIFFERENT METHODS AT THE SOUTH FARALLON ISLANDS, CALIFORNIA

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We used ground/boat (1979-1995) and aerial photographic (1985-1993) survey techniques to estimate the breeding population size of Common Murres on the South Farallon Islands, the largest colony of the central California population. In addition, "index plots" ( $n=9$ , the number of adults censused during peak incubation) and two intensive "study plots" (number of egg-laying sites determined) provided data for comparisons between all-island and sub-colony population trends. After a dramatic decline from 1982-1986, numbers of breeding murres remain in a depleted state owing to a variety of factors including impacts from past and continuing oiling, gill-net mortality, lower recruitment due to ENSO events, and

changes in prey base. Between 1987 and 1989 numbers remained relatively stable at  $\pm 40$ -45K. In the early 1990s, however, the population experienced limited growth, interrupted by the 1992 ENSO. As of 1995, the ground/boat survey indicated a population of  $\pm 65$ K. Ground/boat survey results are comparable to aerial survey results when counting birds from high vantage points, but aerial surveys are vastly superior (obtaining estimates of 50-100% more birds) when counting from below colonies (e.g., from sea) or from great distances. Index and study plots indicated slow growth in the late 1980s and more growth in the 1990s, but numbers in only one index plot grew substantially. All-island vs sub-colony data provide complementary information. The strength of this long-term monitoring program is extensive sampling (both spatially and temporally), and replication which has served to corroborate results obtained using various techniques.

### AT-SEA DISTRIBUTION OF XANTUS' MURRELETS IN THE SOUTHERN CALIFORNIA BIGHT: LESSONS FROM A TELEMETRY STUDY

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We radio-marked 110 Xantus' Murrelets (*Synthliboramphus hypoleucus scrippsi*) at Santa Barbara Island in the Southern California Bight from April to May, 1995-1996. Radio-marked birds were relocated from a telemetry tower on the island and from aircraft flying transects between Mexico and Point Conception. We detected murrelets 1,059 times ( $N=43$  birds) from the tower. Many (39%) murrelets returned to the island after marking. We recorded  $3.8 \pm 2.8$  at-sea locations per murrelet in aerial surveys and relocated them for  $10.0 \pm 9.6$  days. Mean distance between locations was  $46 \pm 34$  km (2-223 km). In 1996, murrelets marked in April were distributed north of Santa Barbara Island from Point Dume to San Miguel Island. Murrelets marked in May were concentrated south of San Nicolas Island. Previous studies indicated murrelets were highly concentrated within 20 km of Santa

Barbara Island from March to May. We found radio-marked murrelets distributed 35-95 km from the island, although many may have been nonbreeders. Murrelets returning to the island after marking were relocated  $52 \pm 19$  km away, indicating longer foraging distances from the colony than previously reported.

#### NESTING PHENOLOGY OF BLACK SKIMMERS IN CALIFORNIA

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Black Skimmers (*Rynchops niger*) have nested in California since 1972. Their population has increased to nearly 1200 pairs in 8 colonies by 1996. In several cases they are nesting in association with terns, particularly Caspian (*Sterna caspia*) and Elegant terns (*Sterna elegans*). In contrast to the terns, Black Skimmers often show a prolonged breeding season with new nests sometimes being initiated as late as September. Year to year variation within and between colonies is extensive. Interspecific interactions may explain some of this variation.

#### VARIABILITY OF THE BILL-LOADS OF RHINOCEROS AUKLETS : A SAMPLER OF FORAGE FISH?

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Rhinoceros Auklets feed mainly on forage fish during their chick rearing season. As size and fish composition of their bill-loads show great variability, they have been thought to be a good sampler of forage fish. However, parents of some alcid species increase foraging effort under poor food availability and their food provisioning is controlled by food demand of chicks also. We have been monitoring bill-loads and chick growth of Rhinoceros Auklets at Teuri Island for eight years. As the recent increase of the availability of Anchovy (*Engraulis japonica*) causes improvement of chick growth of this species through the increase of bill-load size, they seem to be a good sampler of forage fish. To evaluate the effects of food demand of chicks on short-term variability of their bill load size, we also examined 1)

daily variation of bill-load size through the growth of chicks and 2) response of parents to experimental manipulation of chick food demand. Chick growth and experimental manipulation of food demand of chicks did not affect variability of bill-load size: indicating that the parents did not adjust bill-load size to food demand of chicks.

#### POSTERS

#### CAPTURE, RECAPTURE AND DEMOGRAPHY OF MARBLED MURRELETS IN DESOLATION SOUND, BRITISH COLUMBIA

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From 1991 to 1996, 493 adult Marbled Murrelets have been banded in Desolation Sound (Theodosia Inlet), British Columbia. Theodosia Inlet is a flight corridor between forest nesting areas and marine foraging areas and murrelets can be reliably captured using mist nets on rafts. In total, 20 banded individuals have been recaptured at this site in subsequent years and 13 individuals have been recaptured in the same year they were banded. In 1995, we recaptured a bird banded in 1991; thus, it was at least 5 years old. In 1996, we banded 95 murrelets and recaptured 10 individuals which we had banded previously. This provides the first definitive evidence of fidelity to breeding areas for individual Marbled Murrelets. In September 1996, a bird which we had banded in 1995 was recaptured in northern Washington by American researchers. This is the first recapture of an individual at a location other than its breeding area. The demographic focus of our banding program is augmented by radio telemetry, radar censuses, collection of DNA (blood samples) for sex determination and color marking of individual murrelets.

#### DISTRIBUTION AND ACTIVITY PATTERNS OF THE MARBLED MURRELET IN DESOLATION SOUND, BRITISH COLUMBIA

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A marine survey route was designed to study the distribution, abundance and activity patterns of Marbled Murrelets in Desolation Sound and the associated fjords. I conducted regular surveys from April to August of 1996. The pattern of abundance during the day changed over the breeding season. Early in the season, murrelets were more abundant in the morning. In contrast, later in the season, murrelets were more abundant in the afternoon. I will investigate relationships between breeding season chronology, group size and behaviour of murrelets with respect to the abundance patterns observed. In addition, Marbled Murrelets were captured using a system of floating mist-nets. All captured birds were marked with picric acid dye and some were individually marked with different combinations of radios, wing tags, and nasal disks. I tracked birds from the water and from the air to determine distribution and movement of individuals. Resightings of marked birds demonstrates that some individuals remained in Desolation Sound throughout the season. Body and wing moult was also observed among marked and unmarked birds. I assess effects and feasibility of using these markers for Marbled Murrelet population studies.

#### ORGANOCHLORINE PESTICIDES AND PLANAR CHLORINATED HYDROCARBONS IN DOUBLE-CRESTED CORMORANTS FROM THE COLUMBIA RIVER ESTUARY

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The Columbia River receives numerous contaminants from permitted municipal and industrial discharges, nonpoint pollution, accidental spills, and hazardous waste sites. Organochlorine contaminants have been associated with poor reproductive success in resident Bald Eagles (*Haliaeetus leucocephalus*). Elsewhere in the United States, Double-crested Cormorants (*Phalacrocorax auritus*) have been used as sensitive indicators of exposure to organochlorine compounds. The Columbia River estuary supports over 4,000 pairs of nesting cormorants which are exposed to and potentially harmed by or-

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ganochlorine contaminants. We collected cormorant eggs from colonies in the estuary over a four-year period, and in 1993 from a reference colony, to determine concentrations of organochlorine pesticides, polychlorinated biphenyls (PCBs), dioxins, and furans. Concentrations of chemical constituents were generally highest at the upstream island location in the Columbia River. Dioxin and furans were elevated in eggs from the Columbia River islands and were below detection in the reference colony. Dioxin-like compounds in Columbia River eggs were similar to concentrations associated with reproductive impacts in other species. DDE residues were higher ( $P = 0.003$ ) in 1993 eggs from the Columbia River islands than the reference colony. Results of the H4IIE bioassay conducted on eggs in 1993 indicated the TCDD-Equivalents present in tissue would relate to a 23% egg mortality when compared to dose-response relationships developed for cormorants in the Great Lakes.

### DISTRIBUTION AND DENSITIES OF PREDATORS OF MARBLED MURRELETS ON VANCOUVER ISLAND

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We recorded the occurrence and relative densities of potential predators (eagles, falcons, accipiters, corvids and squirrels) of Marbled Murrelets (*Brachyramphus marmoratus*) over five summers (1992-1996) in coniferous forest in Carmanah and Walbran watersheds on Vancouver Island, British Columbia. Data came from two-hour dawn surveys designed to record the activities of murrelets. The combined density of all predators was high at the coast, but at inland stations there was no correlation with distance from the coast. At inland stations, the percent occurrence and relative densities of Steller's Jays (*Cyanocitta stelleri*), Common Ravens (*Corvus corax*), and all predators combined were significantly higher at seven disturbed stations (situated at the edge of clearcuts or roads) than at 17 stations in undisturbed old-growth forest. Within disturbed habitats the occurrence and densities of jays were highest at four stations most frequently used by hikers and campers. Owls (five species) and Red Squirrels (*Tamiasciurus hudsonicus*) were not significantly affected by habitat disturbance

or degree of human visitation. Predation at nests of Marbled Murrelets, and other forest-nesting birds appears more likely at the coast, and near clearcuts and roads, than at other sites.

### FACTORS AFFECTING THE DISTRIBUTION AND RELATIVE ABUNDANCE OF MARBLED MURRELETS DURING THE BREEDING SEASON AT BIG BASIN REDWOODS STATE PARK, CALIFORNIA

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We established five intensive survey stations within old-growth forest habitat of the park and conducted five surveys at each site in 1995 and 1996 as part of a study investigating murrelet use of the park and nest success. Concurrently, another data set on detections was obtained via dawn stakeouts of potential nest trees. We considered three primary influences on detection levels and occupied behaviors: forest structure, corvid abundance, and prey availability. Forest characteristics were quantified through vegetation surveys, corvids were assessed through point counts, and prey availability was inferred from indices of prey abundance. The interplay of these factors will be discussed. Low sample sizes may preclude definitive conclusions, but our preliminary assessment is that murrelet use of the park is highly variable in space and time, and use of different observers can increase variance in detection levels. The stand center had the highest detection levels each year even with high corvid abundance, but forest structure, topography, the confluence of streams, and stand edge interact to influence detection levels and occupied behaviors. This data will be useful in designing a monitoring plan and a general plan for the park.

### SEABIRD, MARINE MAMMAL, AND OCEANOGRAPHY COORDINATED INVESTIGATIONS (SMMOCI) NEAR ANNUAL SEABIRD MONITORING SITES IN ALASKA

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Seabird monitoring has become one of the main sources of information about changes in the marine environment. To understand reasons for fluctuations observed in populations and productivity of indicator species at breeding colonies, it is important to understand the marine habitats upon which these species depend. Scientists studying Steller sea lions (*Eumetopias jubatus*) at breeding rookeries have similar objectives. Recently, a partnership has been developed among the authors and their organizations to characterize the marine environment within the average foraging range of seabirds (25-40 km depending upon target species) around designated sites on the Alaska Maritime National Wildlife Refuge where time-series data are being collected for seabirds and sea lions. Specific objectives include: 1. Estimate biomass of potential seabird and marine mammal prey, 2. Identify common prey organisms, 3. Assess oceanographic characteristics of water masses, 4. Characterize bottom fauna, 5. Record feeding distribution of birds and marine mammals, 6. Assess food web relationships. Examples of results from several sites in the Gulf of Alaska are presented.

### THE USE OF RADAR TO MONITOR CASSIN'S AUKLET ACTIVITY PATTERNS

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We investigated the utility of radar for censusing and gauging activity of burrow nesting seabirds. Radar images of Cassin's Auklet were videotaped during 22:30 - 0400 during 30 April to 11 May on Triangle Island, British Columbia. We used a video image analysis system to analyze

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activity patterns by sampling the video at 30 second intervals. Activity rates increased as peak hatch approached. Abundance in the sampling area was conservatively estimated. Nightly activity patterns were also investigated. We evaluate the potential application of radar as a non-destructive method for estimating numbers of burrow nesting seabirds.

### DIURNAL FEEDING PERIODICITY OF THE TERNS AND SKIMMERS NESTING AT THE BOLSA CHICA ECOLOGICAL RESERVE IN SOUTHERN CALIFORNIA

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The daily pattern of foraging by Caspian Terns, Elegant Terns and Black Skimmers nesting at the Bolsa Chica Ecological Reserve in coastal Orange County, California was examined by recording the numbers of birds returning to the colony with fish over dawn-dusk periods during 13 weekly visits to the reserve. Based on previous observations and known patterns of diurnality in two of the species (Caspian Terns and Elegant Terns) and nocturnality in the Black Skimmer, we tested the hypothesis that each species delivers fish to its chicks with different frequencies at different times of the day. The observation day was divided into four time periods: 0600-0900, 0900-1300, 1300-1700, and 1700-2000. The number of returns did not vary with time period for Caspian Terns. Elegant Terns showed a significant peak in the first (morning) time period. The Black Skimmer showed two significant peaks, in the first and last (morning and late afternoon) time periods, reflecting their nocturnal lifestyle. This study was conducted concurrently with a study on Elegant Tern and Caspian Tern chick provisioning on the nesting island, and should provide further information on the foraging patterns of breeding seabirds.

### ATTENDANCE PATTERNS, PRODUCTIVITY, AND EFFECTS OF DISTURBANCE TO COMMON MURRE (*Uria aalge*) POPULATIONS AT POINT REYES NATIONAL SEASHORE

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We surveyed six small Common Murre sub-colonies at the Point Reyes Headlands, Point Reyes National Seashore, Marin County, California in 1995 and 1996. This study was initiated to investigate the effects of disturbance to local murre populations in the wake of a small shipwreck and subsequent rescue operations. In 1995, one sub-colony was abandoned, and three other sites experienced reduced productivity due to disturbance by Brown Pelicans and predation by Western Gulls and Common Ravens. In 1996, the same sub-colony was abandoned, due to an unknown disturbance. Daily attendance in stable colonies in 1996 fluctuated widely until the onset of egg-laying in early May, and then remained stable until early July, when non-breeders joined the colonies in high numbers. Diurnal attendance varied between days within colonies and between colonies within days. Several disturbances were documented in 1996, including the presence of a pinniped in one sub-colony and disruptions by Brown Pelicans at several sites. A study plot was established at one site, but we were unable to monitor breeding sites to derive productivity estimates. Nonetheless, it is clear that productivity at these coastal colonies is substantially lower than that observed at the nearby offshore Farallon Islands. Future studies are needed to establish year-to-year variations in attendance and to compare such patterns with results from other studies.

### BLACK-CAPPED PETRELS TRACK PULSES OF UPWELLING WITHIN GULF STREAM MEANDERS

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Although a number of long-term studies have demonstrated that pelagic seabirds associate with water masses, none have examined whether the distributions of seabirds consistently shift in relation to real-time changes in the position of physical oceanographic features. In addition, the processes that underlie associations between seabirds and water masses have often been unclear. I studied seabirds off the coast of North Carolina during the spring-fall seasons (May-September) of 1992-1995. Black-capped Petrels (*Pterodroma hasitata*) were most abundant in interior Gulf Stream waters and appeared to track the Gulf Stream's position. Furthermore, Black-capped Petrels were almost twice as abundant on days in which the Gulf Stream front moved offshore as on days in which the position of the Gulf Stream remained stable or moved onshore. Offshore movement of the Gulf Stream results from the passage of low-pressure troughs of Gulf Stream meanders, a process which induces upwelling within the Gulf Stream. Thus elevations in petrel abundance coincided with processes of upwelling, illustrating that investigations of current movement can expose patterns in seabird movement that current position cannot.

### HABITAT CHARACTERISTICS, PROVISIONING RATES AND CHICK GROWTH IN BLACK OYSTERCATCHERS IN THE STRAIT OF GEORGIA, BRITISH COLUMBIA

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We initiated a study of habitat use and reproductive characteristics of Black Oystercatchers. We located and monitored 35 nesting territories during April through August 1996, in the Southern Gulf Islands, Strait of Georgia, British Columbia. Habitat use, nest site characteristics (n=33) and nest histories (n=31) were recorded. Provisioning rates were measured for a subset of territories (n=12) within the study site. Chick growth was measured for all successful territories (n=22), and chicks (n=41) were monitored until fledging (n=15). We examine patterns of provisioning rates, chick growth and fledging success in relation to habitat characteristics.

### DIETARY BREADTH AND OVERLAP IN TERN AND SKIMMER COLONIES NESTING AT THE BOLSA CHICA ECOLOGICAL RESERVE AND THE WESTERN SALT WORKS IN SOUTHERN CALIFORNIA

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Food habits and foraging locations of Caspian, Elegant and Forster's terns and Black Skimmer nesting at the Bolsa Chica

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Ecological Reserve in coastal Orange County and the Western Salt Works in south San Diego Bay were analyzed for the 1995 breeding season based on fish dropped by the birds and on pellets regurgitated mainly by Caspian Terns. The colonies as a whole at both sites fed mainly on clupeoid fishes, especially northern anchovy and Pacific sardine, and atherinid fishes, especially topsmelt. Black Skimmers had the broadest diet and delivered the smallest prey at both sites. Caspian Terns foraged widely in marine, bay-estuarine and freshwater habitats and delivered the largest prey at the Salt Works, whereas Elegant Terns fed mostly in the ocean on northern anchovy and delivered the largest prey at Bolsa Chica. Within-site dietary overlap was limited by a combination of differences in prey type, prey size and foraging habitat but between-site overlap was uniformly high for each bird species. Limited historical data at the two sites suggest that dietary changes reflect shifts in prey abundance.

### SURVIVAL RATES OF CRESTED, LEAST, AND WHISKERED AUKLETS AT BULDIR ISLAND, ALASKA

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Estimates of demographic parameters such as adult survival rate are urgently required for auklet species, which are the most abundant seabirds of the Bering Sea. To address this need, Crested ( $n = 577$ ) and Least auklets ( $n = 191$ ) were captured by day using noose carpets set on display rocks in their breeding colony at Buldir, marked with unique combinations of three Darvik plastic colour bands and a stainless steel band, and survival estimates were derived from resightings during 1990-1996. Whiskered Auklets ( $n = 280$ ) were captured at night using mistnets to intercept birds arriving at their nesting crevices, marked with steel bands, and survival was inferred from recaptures during 1992-1996. Survival estimates were calculated using the SURGE (Survival Generalized Estimation) program. Our estimates of survival averaged about 75% in Least Auklets, 80% in Whiskered Auklets and 85% in Crested Auklets. For all species, survival fluctuated significantly from year to year, possibly due to changing environmental conditions. However, the three species did not vary in concert, suggesting that factors responsible for the variation in adult survival differ among auklet species.

### ADJUSTMENT OF PARENTAL PROVISIONING EFFORT BASED ON CHICK CONDITION IN RHINOCEROS AUKLETS

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Previous research indicates that some seabird parents alter provisioning rates based on the age and size of their chick. I investigated the ability of Rhinoceros Auklets parents to adjust feeding rate according to variation in nestling condition on Triangle Island, British Columbia. Mass at age was used as an index of condition. In the experimental treatment, chicks of different mass but same age were exchanged. In the control group, nestlings with the same age and mass were exchanged. I compare provisioning rates prior to and following the exchanges by measuring the daily mass increments of the chicks. I will also test for differences in provisioning rates to male and female nestlings with the aid of a novel molecular technique to determine gender.

### A COMPARISON OF CASSIN'S AUKLET EGG SIZE AND CHICK GROWTH BETWEEN YEARS AND SEXES, TRIANGLE ISLAND, BRITISH COLUMBIA

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Evidence exists for a positive relationship between egg size and offspring fitness in early chick-rearing. However, slow growing nestlings from smaller eggs may exhibit compensatory growth in the later rearing period. I examine the relationship between chick growth and egg volume between the years 1994, 1995 and 1996. Using a molecular technique to sex the 1996 chicks, I will describe how chick growth and egg volume differs between the sexes. I will demonstrate that even though chick growth was significantly different between years, egg volume did

### SPRUCE BEETLE: A SERIOUS THREAT TO MARBLED MURRELETS IN ALASKA?

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Throughout their range, Marbled Murrelets have lost old-growth forest nesting habitat because of logging. In Alaska, a new threat is the rapid loss of large spruce (*Picea spp*) trees to infestation by spruce beetles (*Dendroctonus rufipennis*). Currently, spruce on about 3 million acres in southcentral Alaska have been killed by beetles. Some affected forests are probable or known Marbled Murrelet nesting areas, including coastal areas of Cook Inlet, Kachemak Bay, the Kenai Peninsula, and northern Southeast Alaska. Beetle infestation has expanded dramatically in the past decade, and has caused upwards to 90% mortality of many coastal old-growth stands in Kachemak Bay. Preliminary surveys in Kachemak Bay suggest that murrelet productivity may be affected due to loss of nesting habitat. Juveniles were observed at sea throughout the bay in surveys conducted in 1988 and 1989. In 1996 only 1 possible juvenile was observed in the inner bay, where surrounding forests are now dead, whereas juveniles were common in the outer bay, where beetle-kill is still minimal. Adult murrelets were ubiquitous, suggesting that food was available throughout the bay. We recommend murrelet surveys be conducted inland and at sea to monitor possible changes in murrelet breeding distribution.

### LONG DIVE OF RHINOCEROS AUKLET IN RELATION TO BODY SIZE

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## ABSTRACTS

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Diving behavior of alcids are largely unknown. Their diving capacity is assumed to be restricted by the small oxygen storage and the relatively high oxygen consumption rate. Using 20 g time-depth recorder, we recorded diving behavior of eight Rhinoceros Auklets (*Cerorhinca monocerata*) which are the smallest birds that have been studied with this type of device. The dives depth and duration was  $15.7 \pm 10.2$  m (range 1-54.2 m) and  $50.1 \pm 27.3$  sec (range 1-148 sec), respectively. As their calculated ADL (aerobic dive limit) was 59 - 87 seconds, 8.7 - 42.6 percent of their dives exceeded ADL. If the birds exceed their ADL and use anaerobic metabolism, the scattering of dive duration and surface interval should show exponential increase in the surface interval. However the scattering of these birds shows linear increase. Based on these data and compared to other studies, there is some possible explanations about this phenomenon. Firstly oxygen consumption rate of this bird would be lower than that we expected. Secondary this bird would use anaerobic metabolism, but would not exceed its capacity of the ability to clearance of end products or the ability to maintain the pH balance in muscle by the strong buffering capacity.

### INDIVIDUALITY OF THICK-BILLED MURRE CALLS

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Individual distinctiveness of calls is strongly needed in animal colonies, since most communication occurs against a background of similar noise. I investigated the individuality of thick-billed murre (*Uria lomvia*) calls at Coats Island, Northwest Territories, to determine if a physical basis for individual recognition was present. There was some individual variation in the calls of even the youngest chicks studied (1 day old). Individuality did not increase with chick age up to 3 weeks, but adult calls were more distinct than chick calls; bird identity accounted for 43.9% of the measured variation in adult calls. Temporal features may be the basis for individual recognition by voice in seabird colonies. They accounted for

twice as much individual variation as frequency features, similar to findings for penguin and common murre calls.

### DISTRIBUTION OF THE RHINOCEROS AUKLET (*Cerorhinca monocerata*) IN NORTH AMERICA

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Rhinoceros Auklets nest from Bristol Bay, Alaska, and Buldir Island in the western Aleutian Islands, south along the coast of North America to southern California. From the late 1960's to the present, this species has expanded it's range south from long established colonies in Washington as far as the Channel Islands near Los Angeles, California. The Farallon Islands were re-occupied in the early 1970's after over 100 years of apparent absence. Rhinoceros Auklets nest in inaccessible caves and cliff crevices along parts of California and Oregon coasts. Nesting occurs almost exclusively in burrows on Castle Island, northern California. In Washington state, Rhinoceros Auklets nest on islands that have deep soil and vegetation such as *Bromus* grasses or shrubs like Salmonberry (*Rubus Spectabilis*). Colonies in British Columbia are forested, although Triangle Island is a grass/forb community. A deep soil layer appears to be an important habitat component in the larger colonies in Alaska.

### STATUS OF BRACHYRAMPHUS MURRELETS AT ADAK ISLAND, ALASKA

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Investigations of Marbled and Kittlitz's murrelets in the Aleutian Islands have been limited. We studied their distribution, relative abundance, seasonal trends, and breeding chronology at Adak Island in the central Aleutians from 1993 to 1995. This site is unique in its geographic isolation, its total lack of trees, and its isolation from population impacts including logging and gill net fisheries typical of other regions. We estimated that approximately 800-1,000 murrelets, predominately Marbled Murrelets, used the island's nearshore waters, primarily during the breeding season. Shore and boat-based surveys described fluctuations in abundance and distribution which were likely related to nesting activity and shifts in prey availability. Detections of Marbled Murrelets on dawn watch surveys first occurred in May, peaked from mid-July to mid-August, and diminished by early September. Detection levels were relatively high (up to 111) when compared to other treeless regions. Murrelets were detected most frequently during the 60 minute period starting 45 minutes prior to sunrise. Approximately 95% of detections were aural and murrelets were rarely seen on dawn watches, indicating they may have used fog as a visual barrier to predators. There were significant increases in the number of detections ( $P=0.008$ ), detection duration ( $P=0.027$ ), and the time of the last detection ( $P=0.006$ ) during late summer.

### INFLUENCE OF A SHALLOW OFF-SHORE SEAMOUNT ON SEABIRDS

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Seamounts are common topographic features of deep oceans; there may be more than 30,000 seamounts with heights exceeding 1000m in the Pacific Ocean. Seamounts appear to represent dispersal stepping-stones for plants, invertebrates and fish. With few exceptions (Blaber 1986, Bourne 1992, Haney *et al.* 1995) little attention has been focused on the influence of seamounts on seabird distribution. I conducted seabird surveys at Cobb Seamount (46°45'N x 130°48'W) in July 1991 and June 1992. Though 500km from land, Cobb rises from the 2800m

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abyssal plain to well into the euphotic zone (shallowest point 24m). Detectable responses of phytoplankton, zooplankton and larval fish extended out approximately 1 seamount diameter (~30km). Comparing moving averages, total seabird densities over the summit ( $\pm 5\text{ km}$ ) were 2.5 and 2.3 times higher in 1991 and 1992, respectively, than off-seamount ( $25 \pm 5\text{ km}$ ). Both years, Black-footed Albatross (*Diomedea nigripes*), Fork-tailed Storm-Petrel (*Oceanodroma furcata*) and Leach's Storm-Petrel (*O. leucorhoa*) dominated the seabird assemblage. Compared to off-seamount, average summit densities of Black-footed Albatrosses were 2.6 (1991) and 3.6 (1992) times higher; Fork-tailed Storm-Petrels were 6.9 (1991) and 8.5 (1992) times more abundant; and Leach's Storm-Petrels were 3.1 (1991) and 1.5 (1992) times more numerous. Improved prey availability and/or higher concentrations (primarily larval rockfish *Sebastodes spp.*) may explain the observed seabird aggregations.

### EFFECTS OF DIET QUALITY ON POST-NATAL GROWTH OF SEABIRDS: CAPTIVE FEEDING TRIALS

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Declines in availability of high quality forage fishes (sand lance, herring, capelin) have apparently contributed to the lack of recovery of some seabirds that were injured by the *Exxon Valdez* oil spill. This study tests the hypothesis that lipid content of the diet is one factor constraining the growth and development of piscivorous seabirds. We raised Black-legged Kittiwake and Tufted Puffin nestlings on controlled diets of either capelin, Pacific sand lance (both high lipid content fishes), or walleye pollock (low lipid content). Both kittiwake and puffin chicks fed capelin or sand lance had much higher growth rates of body mass and somewhat higher growth rates of wing length than chicks fed the same biomass of pollock. Differences in mass gain between diet groups were more pronounced than differences in wing growth for both seabird species, suggesting that undernourished nestlings will preferentially allocate lim-

ited resources to development over mass gain. Puffin chicks converted food biomass to body mass more efficiently than kittiwake chicks. We conclude that when parental provisioning rates are constrained, the lipid content of forage fishes fed to seabird nestlings limits their growth and development.

### GENETIC VARIABILITY OF CORY'S SHEARWATER (*Calonectris diomedea*) IN THE N.E. ATLANTIC REVEALED BY DNA FINGER-PRINTING

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DNA fingerprinting was used to compare levels of genetic variability within and between eight colonies of Cory's Shearwater (*Calonectris diomedea borealis*) in the Madeira, Azores, Canaries and Berlenga archipelagoes in the northeast Atlantic. Fingerprint diversity, as measured by one probe and two restriction enzymes, showed very little correlation with population size, suggesting that genetic diversity reflects recent history rather than current population size. Mean band sharing between pairs of colonies ( $Sab=0.238 \pm 0.094$ ,  $n=680$ ) did not show any relation with geographic distance between colonies, but was significantly lower than the mean band sharing within populations ( $Sxy=0.277 \pm 0.137$ ,  $n=592$ ) ( $ts=5.932$ , 1270 df,  $P<0.001$ ) implying a small degree of population structure across the range of this subspecies. Evidently there is sufficient gene flow between colonies to prevent populations from becoming considerably distinct at these loci ( $F_{ST}=0.056$ ), despite the morphological and behavioural differences known to exist between the sampled colonies of this highly philopatric species.

### MARBLED MURRELET NEST-FINDING EFFORTS - EFFEC-TIVENESS OF VARIOUS TECH-NIQUES AND THE DISCOVERY OF A NEW TYPE OF NEST

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Over 450 person-days were spent searching for murrelet nests in Big Basin Redwoods State Park, California during the breeding seasons of 1995 and 1996. Four techniques were used: (1) scoping platforms from the ground, (2) searching beneath trees for eggshell fragments, (3) climbing trees in which other evidence suggested nesting, and (4) staking out potentially suitable nest trees at dawn. No evidence of nesting was found in 1995. In 1996, one active nest, one failed nest, and one set of eggshell fragments were found. The paucity of nests found may be due to extensive predation from large numbers of Common Ravens and Steller's Jays; and possibly a reduced nesting effort in 1995. The active nest was monitored by video camera for 12 days until the chick fledged on 21 July. This nest cup was situated against the bole of the nest tree - a 1.7 m diameter old-growth Coast Redwood. This nest was unique, being the first murrelet nest to be found in an abandoned Western Gray Squirrel nest.

### USING INFRARED VIDEO TO PROBE PUFFIN AND AUKLET BURROWS: A "CANDID" CAMERA FOR BURROW-NESTING SEABIRDS

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In 1995 and 1996, field crews at St. Lazaria Island, Alaska, used a small, maneuverable video camera to investigate status and occupancy of Tufted Puffin and Rhinoceros Auklet burrows. Its benefits included: minimized burrow damage which can result from more intrusive techniques of assessing burrow status, less stress to burrow occupants relative to other techniques, and less work for investigators who otherwise would need to excavate a moderate proportion of burrows. The system was designed to be durable and water-resistant. The primary disadvantages of the system were its lack of maneuverability in some burrows (due to roots, rocks or sharp burrow angles) and insensitivity in detecting other burrow occupants (i.e., unattended Storm-Petrel eggs). While commercial versions of the camera are available, this paper describes

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the system components and costs for those interested in applying the technology to their studies.

### MOLT IN COMMON MURRES: A NOVEL SEQUENCE OF FEATHER REPLACEMENT AMONG "WATERBIRDS"

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Ornithological dogma suggests that most diving waterbirds (e.g., loons, grebes, ducks, large alcids) lose all their remiges simultaneously and in random order during their annual flight feather molt. Common Murres do lose all remiges rapidly -- probably within a few days, but they do so in a very ordered way; primaries are dropped first, beginning in the middle of the primaries (P3, P4 or P5) and progressing both inward and outward. In all cases, the outermost primaries are lost before the innermost ones; P2 and then P1 are the last two primaries to be lost. Primary regrowth is rapid and begins nearly simultaneously in all follicles; however, middle primaries are the first to appear, mirroring the sequence in which they were lost. Secondaries drop in seemingly random order when primary replacement is well underway, and appear to regrow simultaneously. Rectrices drop in a variable but non-random order well after secondary replacement is well advanced. Primary molt is completed in approximately 25 days.

### EVOLUTIONARY RELATIONSHIPS AMONG THE AUKLETS: A PHYLOGENETIC STUDY BASED ON DNA SEQUENCES

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An understanding of mechanisms of speciation is of paramount importance to evolutionary biology. Phylogenetic reconstruction can reveal the evolutionary relationships among species, from which mechanisms of speciation may be inferred. Molecular markers such as the rapidly evolving mitochondrial genome and non-coding regions of nuclear DNA may

be used to produce phylogenetic hypotheses. Despite the large body of data available, evolutionary relationships among the auklets, a group of five Northern Hemisphere seabirds (Family: Alcidae), are unclear. To resolve the phylogenetic affinities among the auklets, and to infer the mode of speciation within this group, nucleotide sequences were collected for the mitochondrial ATPase 8 and ATPase 6 genes, and for intron 8 of the nuclear gene for alpha-enolase. Primers were designed for PCR amplification, and ~840 base pairs of the ATPase genes and ~335 bp of the alpha-enolase gene were sequenced. Analysis of single-stranded conformational polymorphisms (SSCPs) of intron 8 of the nuclear alpha-enolase gene indicated that most of the auklet samples analyzed were heterozygous in this region of the genome. Analysis of the sequence data did not resolve the phylogenetic tree for the auklets, a fact that supports the hypothesis that these birds evolved from a single ancestral species within a short time span (rather than as sequential bifurcations). This is consistent with the micro vicariance model of speciation (a subset of peripatric speciation). Numerous small populations of an ancestral species may have become peripherally isolated in separate glacial refugia during a past glaciation, and evolved separately due to adaptation to local conditions and random processes such as genetic drift.

### TECHNIQUES FOR THE CAPTURE AND RADIO-MARKING OF XANTUS' MURRELETS IN THE SOUTHERN CALIFORNIA BIGHT, 1995-1996

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We captured 459 Xantus' Murrelets (*Synthliboramphus hypoleucus scrippsi*) at sea beside breeding islands (Santa Barbara, Anacapa, and San Clemente islands) in the Southern California Bight during April and May, 1995-1996. Three-person teams worked at night (22:00-04:00 hrs) from inflatable Zodiac boats, using spotlights to assist bird captures with dip nets.

Captured birds were delivered to a larger research vessel where another team obtained data and performed procedures prior to release (i.e. measurements, banding, blood samples, radio attachments). Our overall capture rate (4.8 murrelets/hr) was conservative because capture efforts were intermittent through the night. Up to 12 murrelets/hr were captured during peak capture effort and success. We radio-marked 110 murrelets with two different attachment techniques: 1) two non-absorbable sutures with marine epoxy; and 2) stainless-steel subcutaneous anchor and one non-absorbable suture with marine epoxy. We discuss the lifespan of these two attachment techniques and the use of isoflurane (inhaled anesthetic) in a prototype system to improve handling.

### ADULT SURVIVAL OF RED-LEGGED KITTIWAKES

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Apparent declines in abundance of the Red-legged Kittiwake combined with poor reproductive performance for the last several years have recently alarmed resource managers. One key to understanding if current levels of productivity are sufficient to maintain population equilibrium is adult survival rates. Since 1988, about 291 breeding, adult Red-legged Kittiwakes have been uniquely banded and resighted in subsequent years at Buldir Island, Aleutian Islands, Alaska as part of a long-term monitoring program. I estimated the mean over-winter survival rate of Red-legged Kittiwakes using an enumeration method, a Jolly-Seber model (program JOLLY) and SURGE. The adult survival rate was high and in all 3 methods exceeded 0.96. Mean adult life expectancy (depending on the formula used for calculation) is approximately 24+ years, nearly double the estimate for their sympatric congener, the Pacific Black-legged Kittiwake. Although not observed during the course of the study, infrequent, wide-scale stochastic events such as disease or starvation could greatly increase mortality and decrease survival rates. Future plans include continued monitoring of survival rates at Buldir Island, where Red-legged Kittiwake populations have increased since the 1970s for comparison with survival rate data being collected at the

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Pribilof Islands, where populations have recently declined.

### SEX RATIO IN MARBLED MURRELETS (*Brachyramphus marmoratus*): APPLICATION OF A NOVEL MOLECULAR SEXING TECHNIQUE, AND IMPLICATIONS FOR CONSERVATION AND MANAGEMENT

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In this study, we report data on sex-ratio of Marbled Murrelets for a large sample of birds (n=177) mist netted at Desolation Sound, British Columbia in two years (1994 and 1995). Murrelets are sexually monomorphic and sexes are indistinguishable in the field or in the hand. We describe the application of a novel molecular sexing technique which reliably sexed 100% of birds. Sex ratio was heavily male biased, with 1.98 males: 1 female. Preliminary demographic models for Marbled Murrelets have assumed a 1:1 sex ratio. Our results therefore have important implications for the conservation and management of this species.

### CIRCUMPOLAR SEABIRD WORKING GROUP

Kent Wohl and Vivian M. Mendenhall, Nongame Migratory Bird Management, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, Alaska 99503 USA, wohl\_kent@mail.fws.gov

The Circumpolar Seabird Working Group was formed in 1993 under the auspices of the Arctic Environmental Protection Strategy, Conservation of Arctic Flora and Fauna. Biologists representing the governments of the United States, Canada, Iceland, Greenland, Norway, Finland, and Russia meet annually. The group functions as an international forum to facilitate and coordinate Arctic seabird conservation, research and management activities. Nine projects are underway. The International Murre Strategy and Action Plan and Eider Strategy and Action Plan will be completed in 1996 and 1997, respectively. The Circumpolar murre banding and monitoring plans will be completed and implemented in 1997. The second issue of the Circumpolar Seabird Bulletin appeared in Fall 1996. The Circumpolar Seabird Colony Catalog database will be implemented in 1997. Disturbance problems at seabird colonies and relevant laws and mitigation measures have been summarized. Summaries of the harvest of seabirds and incidental mortality of seabirds in fishing gear will be completed in 1997.

### UTILIZATION OF INFRARED CAMERAS FOR OBSERVATIONAL STUDIES OF ALCIDS AT THE OREGON COAST AQUARIUM

J. S. Yannone, P. A. Shreve, and Laurie L. Brogan, Oregon Coast Aquarium, 2820

SE Ferry Slip Road, Newport, Oregon 97365 USA

The Oregon Coast Aquarium recently used infrared camera technology to obtain behavioral data on a nesting pair of Tufted Puffins (*Fratercula cirrhata*). The camera was placed in the pair's burrow the day the chick hatched and ran until the chick fledged. All footage was recorded and archived. For the first three days after hatching, the camera ran 24 hours per day. Footage was then collected randomly.

The infrared camera allowed us to observe many parent-chick interactions such as, brooding and feeding. Parental interactions such as, incubation switches and behaviors in the presence of the chick were also observed. The data on adult-chick interactions during feeding revealed a sequence of interesting events. Our initial hypothesis was that the parents dropped a load of fish on the earthen floor of the burrow and the chick ate on its own. Our observations showed instead that the parent stimulated the chick by bringing fish in and held the fish while the chick pulled on it. This tug-of-war behavior concluded with the parent eventually releasing the fish. This behavior lasted for 15 minutes initially and shortened as the chick aged.

The use of the infrared camera has proved invaluable for recording seabird behaviors. We intend to utilize this technology in the future to capture detailed observations of our breeding Rhinoceros Auks (*Cerorhinca monocerata*), Pigeon Guillemots (*Cephus columba*) and the newest member of our collection, the Marbled Murrelet (*Brachyramphus marmoratus*).

# PSG NEWS

## THE WASHINGTON REPORT

by Daphne Gemmill

In 1992 with the election of President Bill Clinton and Vice President Al Gore, many environmentalists rejoiced. The Clinton Administration outlined an ambitious environmental agenda. The 103rd Congress went down in the record books as the Congress with a poor environmental record. The dreams were never realized due to lack of leadership from President Clinton, Vice President Gore, the Democrat-controlled House and Senate, and environmental groups, coupled with higher priority issues of a balanced budget, health care reform, and crime prevention.

Then came the Congressional elections of 1994. The newly elected Republican majority in the House and Senate sought to change major environmental laws. Their ideas galvanized environmental groups, the White House, and a Congressional bipartisan coalition. By the end of 1996, numerous anti-environmental bills and amendments had been defeated, and major environmental legislation, such as the Farm Act, Safe Drinking Water Act, and pesticide reform had passed. The 104th Congress enacted more major environmental legislation than the last two congresses combined.

In 1996 protecting the environment was a campaign issue. Voters reelected President Clinton and Vice President Gore and the Republican Congress, ensuring two more years of divided government. A handful of Senators and Representatives with poor environmental voting records were defeated. The Republicans retained their majority in the House for the first time since 1928, and the composition of the Senate is more conservative than it was in 1994. The 105th Congress has opportunities to build on its bipartisan, environmental successes at the end of the previous session.

### The 103rd Congress: 1993-1994

The 103rd Congress became known as the do-nothing Congress. One major environmental bill, the California Desert Protection Act, squeaked through Congress. The Act designated 3.5 million acres of Bureau of Land Management

Land in southern California as wilderness, elevated Joshua Tree and Death Valley national monuments to national parks, and created a new national preserve in the East Mohave Desert. It was the largest land protection bill passed for the lower 48 states. Several other environmental bills slipped through Congress, including reauthorization of the Marine Mammal Protection Act.

Reauthorization of the Endangered Species, Clean Water, and Coastal Zone Management Acts; Superfund; elevation of The Environmental Protection Agency to cabinet status; ratification of the Convention on Biological Diversity; and mining and grazing law reforms failed. Many of these bills succumbed due to property rights and cost/benefit-comparative risk amendments.

### The 104th Congress: 1995-1996

After the first session of the 104th Congress, conservationists looked backed with nostalgia at the 103rd Congress. Congress placed a moratorium on listing new species under the Endangered Species Act. Early in the session, the President signed a budget-cutting rescission bill that contained a salvage logging of dead and diseased trees rider. The rider overrode all environmental laws and allowed logging in areas of national forests with virtually all live trees.

Attempts to weaken the Endangered Species Act, Clean Water Act, and reduce agency budgets failed. The salvage timber rider expired. The thirteen month moratorium on listing endangered species ended. Not wanting to face angry voters, whom poll after poll showed cared deeply about protecting the environment, members of the 104th Congress passed the Farm, Safe Drinking Water, Coastal Zone Management, Sustainable Fisheries, National Marine Sanctuaries Preservation, Omnibus Parks, and Antarctic Science, Tourism and Conservation Acts, an amendment to prohibit new offshore oil drilling, and pesticide reform relating to pesticide safety levels in foods, which had been in the pipeline for fifteen years. Most of these actions have implications for bird conservation.

Federal Agricultural Improvement and Reform Act: In March 1996, President

Clinton signed the Farm Act, extending its programs for another five years. The incentive provisions of the bill are good, but the disincentives sections could have been stronger.

The Farm Act contains strong conservation provisions. Among them are a range of carrots and sticks for farmers to protect their land for the benefit of its productivity and for wildlife. Among the carrots are (1) the Conservation Reserve Program, a voluntary program which pays farmers to retire environmentally sensitive lands from production for ten years, (2) the Wetland Reserve Program that restores and protects wetlands previously modified for crop production and (3) the Emergency Wetlands Reserve Program, which operates similarly and provides all of the same benefits, which helps landowners restore flood-damaged, floodplain croplands to wetlands if the cost of levee reconstruction and cropland renovation exceed the value of the land. Among the "sticks" are "sodbuster" and "swampbuster," which respectively discourage farmers from plowing up never-plowed, but highly erodible land or wetlands for crop production.

These provisions have increased populations and nesting success of waterfowl, upland game, and non-game species. As a result of these carrots and sticks, increased expenditures for recreational activities such as hunting and bird watching have generated more than \$13 billion in benefits to rural economies and all of society according to Biological Resource Division (formerly National Biological Survey) economists.

Coastal Zone Management Act: The reauthorization of the Coastal Zone Management Act, the nation's foundation for coastal protection.

Sustainable Fisheries Act: This Act reauthorized the Magnuson Fishery Conservation and Management Act. The cornerstone of the Act are its provisions to prevent overfishing, rebuild stocks of fish that have declined due to overfishing, and reduce bycatch. A provision to protect critical marine habitat for fisheries will also benefit birds and other marine life.

National Marine Sanctuaries Preservation Act: The Act authorizes \$45 million over three years to protect the nation's

## PSG NEWS

marine sanctuaries. Congress has designated fourteen sites ranging in size from the 0.28 square-mile Fagatele Bay, American Samoa, to the 4,024 square-mile Monterey Bay, California. Thunder Bay, Michigan and Northwest Straits, Washington are undergoing review prior to designation.

**Omnibus Park Act:** Although the Act contained many good measures such as protection for the Presidio historic site in San Francisco and the Tallgrass Prairie in Kansas, it removed eight beaches in Florida from the Coastal Barrier Resources System (CBRS), setting a precedent for other coastal states. The CBRS makes new development on sensitive and hazardous beaches ineligible for federal flood insurance and other federal subsidies.

**Antarctic Science, Tourism and Conservation Act:** The Act provides the authority for the United States to ratify the most recent extension to the Antarctic Treaty, the Protocol on Environmental Protection. The Protocol sets forth mandatory rules for the protection of the environment of Antarctica (e.g., guidance for all Antarctic visitors and tour operators, a system of environmental assessment procedures, a Committee for Environmental Protection, and management of Antarctic protected areas that are off-limits to visitors), and the promotion of scientific research there.

### The 105th Congress: 1997-1998

The 105th Congress is faced with all the contentious environmental issues of the last four years, many of which are important for bird conservation. Groups representing oil, timber, mining, livestock and real estate development industries seek to weaken The Endangered Species Act. The future of the Arctic National Wildlife Refuge as a pristine area where over 130 different species of birds nest each summer is in doubt. Some would sacrifice the magnificent coastal plain of the Arctic Refuge, called the biological heart of the Refuge in the hope that 100 day's worth of oil may be found beneath its surface. The Wild Bird Conservation Act is up for re-authorization. Some groups want to amend it to make it easier to import exotic birds. A Forest Health bill would change the way the national forests are managed, thereby reducing protection for the Marbled Murrelet and other forest dwelling birds.

The Wildlife Diversity Funding Initiative, or Teaming with Wildlife, will be introduced in this session. The Interna-

tional Association of Fish and Wildlife Agencies is spearheading the effort, which has major implications for bird conservation. The concept has over 1,000 endorsements including the late Roger Tory Peterson, Chandler S. Robbins, the American Bird Conservancy, American Birding Association, local chapters of the National Audubon Society, the American Ornithologists' Union, optical companies, outfitters, retail stores, photography companies, and publishing houses.

For more than half a century hunters and anglers have willingly paid a user fee on their equipment to the Wildlife (Pittman-Robertson) and Sport Fish (Wallop-Breaux) Restoration Funds to establish a legislatively dedicated user fee to the tune of \$350 million per year to restore populations of sport fish and game that were once critically low, such as wood duck, pronghorn antelope, white-tailed deer, and striped bass, and have conserved millions of acres of habitat. These funds collected at the Federal level and distributed to states have formed the basis for major conservation and restoration funding in the area of game fish and wildlife.

Many alternative funding mechanisms have been explored for funding non-game species conservation programs including federal fund appropriations, license plate and stamp sales, entrance fees, private donations, tax check-off and recreational permit fees. None of these options proved as efficient, reliable, secure, and adequate as a modest user fee on outdoor products.

The Wildlife Diversity Funding Initiative, or Teaming with Wildlife, would do the same thing for non-game species. What amounts to the price of a pack of gum or a movie ticket will raise \$350 million to conserve fish and wildlife diversity and enhance the associated recreational and education opportunities. The user fee will never exceed 5% of the manufacturers' cost on a product.

The goal is to conserve a diverse array of fish and wildlife and their habitats with an emphasis on preventing species from becoming endangered through habitat purchase, population surveys, and reintroduction programs; to enhance the outdoor recreational experiences through viewing blinds, trails, and saving outdoor corridors; and to foster a responsible stewardship ethic through conservation education efforts such as interpretation signs and programs, nature centers, and school curricula.

How would the law work?

**1. Products Covered:** The outdoor products being considered for a user fee are: outdoor recreation equipment including backpacks, sleeping bags, tents, canoes, mountain bikes, etc.; optical equipment including binoculars and spotting scopes; photographic equipment, including film and camera; backyard wildlife supplies including bird seed, feeders, houses, and baths, etc.; guide books including field identification and how to find guides; and recreational vehicles and sport utility vehicles.

**2. Fee:** The amount of the user fee will be based on a percentage of the manufacturers cost (inventory value) of the product, ranging from low of 0.25% to a maximum of 5%. The user fee will be reflected in an increased retail price paid by the consumer that could add 13 cents to the sale of a \$10 field guide or \$1.90 to a \$100 pair of binoculars.

**3. Collection:** The U.S. Treasury collects the user fee as excise taxes from the manufacturers or through import duties to pass to the U.S. Fish and Wildlife Service. The manufacturer would bill this cost to the retailer, to be paid by the user/customer. Manufacturers would pay these fees through routine, quarterly IRS reports.

**4. Product Identification:** The consumer would look for a green logo on the products tag to know that funds were dedicated to wildlife conservation, recreation and education.

**5. Funding Allocation:** Funds would be allocated to each State using a formula based on population (2/3) and land area (1/3) of each state. No state or Territory would receive less than 0.5% or more than 5% of the total funds. States and Territories will need to match these funds with non-federal dollars on a 25% state to 75% federal basis. Matching funds can be cash or in-kind. The law will specify that funds cannot be diverted for any other use. Funds will be dedicated by law for wildlife diversity projects focused on conservation, recreation, and education and for the primary benefit of fish and wildlife other than game species.

**6. Application for Funds:** Each state would prepare a federal aid application addressing the specific needs and priorities within their State, and which meets the characteristics and design of the law. A joint agreement will be signed with the USFWS office of Federal Aid, allowing for the allocation of the funds to the State.

States will have the flexibility to tailor particular programs to meet unique and varying needs. A grants program will be created for projects or regional and national significance.

7. Compliance: The Office of Federal Aid will oversee compliance and there will be periodic federal audits. The Wildlife and Sport Fish Restoration Programs have had a remarkable, fifty years record of success in this regard.

8. Public Participation: Each state fish and wildlife agency will ensure that public input will be sought on all aspects of the program from submission of the application to implementation. Each state agency will work to broaden its public constituency beyond the traditional constituency of hunters and anglers.

Here are a few ways that Teaming with Wildlife will benefit birds:

- Restore, acquire, manage, and secure more bird habitat
- Help build a North American Bird Conservation Plan
- Support avian research
- Assist private landowners in managing their land for bird diversity
- Supply grants to universities, bird clubs, conservation groups, and state and federal agencies for worthwhile projects
- Provide educational opportunities such as trails, boardwalks, observation towers, viewing blinds, field trips, educational materials, and checklists.
- Provide a voice for ornithologists and birders in the conservation of our nation's birds
- Nurture the next generation of ornithologists and birders.

The sponsors are reviewing a draft bill and committee hearings will follow. New bills rarely reach the President's desk for signature in their first year and often take seven years from the time they are first introduced to finally becoming law.

If you would like to follow the progress of environmental legislation in the 105th Congress see the following web sites:

National Audubon Society:  
<http://www.audubon.org/audubon>

National Wildlife Federation:  
<http://www.nwf.org/nwf>

American Ornithological Union:  
<http://www.nmnh.si.edu/BIRDNET>

## SEABIRD CONSERVATION AND BYCATCH

In March 1997 the Food and Agriculture Organization's Committee (FAO) on Fisheries held its Twenty-second Meeting in Rome, Italy. The United States delegation, through the U.S. Fish & Wildlife Service, suggested a technical consultation on seabird bycatch. Japan sponsored this resolution and the Committee on Fisheries adopted it.

A technical consultation is a meeting where experts from around the world discuss a problem and set up guidelines to address it. The Committee on Fisheries then uses those guidelines to establish the FAO policy which becomes a part of each nation's commitment. The Fish & Wildlife Service will provide a panel of experts to prepare the background papers to be discussed in the technical consultation and help organize the consultation.

Japan suggested that the technical consultation on seabird bycatch take place in December 1997. The number of experts should not exceed 15 and should come from as many areas of the world as possible. How good the FAO policy on seabird bycatch will be depends on how well biologists prepare the technical consultation, especially the background papers.

## TROPICAL SEABIRD CONSERVATION FORUM

At the Pacific Seabird Group Annual Meeting in Portland, a number of members interested in tropical seabird conservation (tropical and subtropical areas of the Pacific) met to discuss how PSG and its individual members can become involved and raise awareness of tropical seabird conservation. This initial discussion resulted in many good ideas for how PSG can have more of a presence in these areas and also how members can contribute in various projects. A majority of individuals agreed that an open forum in Pacific Seabirds would be a method for individuals to highlight significant research or conservation work in-progress, identify specific conservation needs, and also serve as a site for further discussion and action by PSG. Perhaps most impor-

tantly, many people agreed that simply identifying current needs or actions with a contact person would be the best method for individual members to become involved. Scott Johnston, PSG's Regional Representative for the Pacific Rim, has agreed to help develop the forum and serve as a clearinghouse for ideas, suggestions, and items for inclusion in the forum. Please send any comments or submission to Scott (addresses on the Executive Council page in back of PS).

The following items are the results of the initial discussion on tropical seabird conservation:

1. Methods for PSG involvement in tropical seabird conservation.
- Members identify specific conservation issues and address to write for more information or action.
- Members draft letters supporting conservation actions, research, or legislation.
- Members publish specific projects for funding or assistance within the forum.
- Publish a home page devoted to tropical seabird conservation.
- Mentoring of tropical biologists (requires identification of people seeking mentoring).
- Sponsor a membership to Pacific Seabirds for someone in the Pacific (requires identification of people seeking membership).
- "Adopt-an-Island": PSG members adopt an island and determine threats, data gaps, history, resources, etc.. Publish in PS to raise awareness and promote specific conservation tasks.

### 2. Specific Topics

#### Christmas Island

- potential for PSG as clearinghouse for communication with industries to promote conservation.
- agency people need more equipment such as boat motors.
- potential for graduate student projects.
- school education is possible: Phoenix petrel is on national stamp.
- worksheets or coloring books could be used for education.
- draft letter to IUCN re: conservation needs and opportunities.
- has own home page - could assist with developing further.
- Blue Water Cruising Association - publication that could reach sailors traveling in the tropical Pacific to encourage conservation action.

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- Develop methods for reaching long-line fisheries in order to reduce conflicts with seabirds.

### Clipperton Island

- many island uninhabited, but development is potential issue.
- PSG could bring up issues of conservation value in press or other media.
- potential World Heritage Site.
- contact with French biologists is necessary.
- BBC is looking for sites to do documentary.

### Galapagos Islands

- requires monetary and international support for conservation efforts.
- PSG as clearinghouse for issues of importance for Galapagos.
- Darwin Research Station has home page.

If you are interested in more information on any of these topics and would like to be in contact with a lead person, please contact **Scott Johnston**. If you have additional information or would like to take the lead on any of these issues, please volunteer. Thank you for your interest in tropical seabird conservation. Look for the Tropical Seabird Conservation Forum in upcoming issues of PS.

*Scott Johnston*

## PSG HANDBOOK

A handbook is being created to help members of PSG, especially the Executive Council, become familiar with the operations of our organization. It will include information about PSG's goals and vision, our bylaws, policies and guidelines, and committee activities. The highlight of the document will be a section on the details of organizing the annual meeting, the cornerstone of our interaction with one another. If you have any ideas for topics that you think should be included in this document or are interested in reviewing and contributing to a draft, contact **S. Kim Nelson** at [nelsonsk@ccmail.orst.edu](mailto:nelsonsk@ccmail.orst.edu) or (541)737-1962.

*S. Kim Nelson*

## PSG AWARDS - CALL FOR NOMINATIONS

Several years ago PSG instituted a series of awards to recognize the accomplishments of individuals who have made significant contributions to either conservation, science, or education regarding seabirds, or who have made an outstanding contribution to the success of the Pacific Seabird Group. In order to provide structure to the process of selecting worthy individuals to receive awards, the Executive Council created the Awards Committee, consisting of the Chair-elect, the current Chair, and past Chair, to solicit and review nominations. The Past Chair coordinates this committee. The committee will make recommendations to the full Executive Council, who will in turn vote on awards to be presented at future meetings. There is no mandate to present these awards at every meeting.

The Awards Committee would like to receive nominations as appropriate, in two categories: Lifetime Achievement and Special Achievement. The Lifetime Achievement award is appropriate for a distinguished seabird researcher, educator, or conservationist who has made contributions in their field benefiting seabirds spanning several decades or a career, or who has been an outstanding, respected, and renowned contributor to the world of seabird science. **Karl Kenyon**, a Life Member of PSG, was the first recipient of this award which bears his name (Kenyon Lifetime Achievement Award). His substantial record of accomplishment is a model for whoever might be selected for future awards. The Special Achievement award is given to an individual who has performed service for PSG spanning many years, who has otherwise benefitted the organization, or who has achieved an outstanding and significant exemplary accomplishment for the betterment of seabird research, education, or conservation.

To nominate a candidate, please prepare and submit a brief statement of the individual's accomplishments and contributions to **Bill Everett**. If the nomination you submit is accepted, you should be prepared to conduct a short presentation on the individual at a PSG meeting, and write a summary for Pacific Seabirds. The deadline for submissions for awards to be

presented at the 26th Annual PSG Meeting in 1999 is 1 December 1997.

### *Bill Everett*

Endangered Species Recovery Council, Post Office Box 1085, La Jolla, California 92038 USA. Telephone: (619) 589-0870 Facsimile: (619) 590-6983

## ELECTION RESULTS

Officers elected or re-elected to the Executive Council included **Alan Burger** (Chair-Elect), **Jan Hodder** (Treasurer), **Craig Harrison** (Vice Chair for Conservation), **Tony Gaston** (British Columbia Rep.), **Roy Lowe** (Washington and Oregon Rep.), **Pat Baird** (S. California Rep.), and **Jim Lovvorn** (Non-Pacific US Rep.). **Bill Everett** became Past-Chair and **S. Kim Nelson** became Chair. **Vivian Mendenhall** remains in her position as Secretary. Other Executive Council members are: **David Duffy** (Alaska and Russia Rep.), **Elizabeth McLaren** (N. California Rep.), **Scott Johnston** (Pacific Rim Rep.), **Mark Tasker** (Old World Rep.), and **Steve Speich** (Editor of Pacific Seabirds). See last page of Pacific Seabirds for the addresses of the Executive Council.

## LOST AND FOUND IN PORTLAND

Lost: a black semi-rigid notebook briefcase during the Executive Council meeting on Saturday 11 January. If found please contact John Jansen at [jansen@racesmtp.afsc.noaa.gov](mailto:jansen@racesmtp.afsc.noaa.gov).

Found: Three seabird books purchased at Powell's Book table. If these books are yours contact S. Kim Nelson at (541)737-1962 or [nelsonsk@ccmail.orst.edu](mailto:nelsonsk@ccmail.orst.edu).

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## REPORT ON THE 24TH ANNUAL MEETING

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PSG's 24th annual meeting was held in Portland, Oregon 8-12 January 1997. Registered attendance was 251 (including 60 students). The local committee included **Dave Renwald**, **Martin Nugent**, **Tara Zimmerman**, **S. Kim Nelson**, **Amanda Wilson**, and **Emi Holton**. Thanks to all the volunteers who helped with registration, chairing paper sessions, the sales table, and logistics, and thanks to the speakers who contributed their research results and expertise. The meeting was a great success!!

### The Scientific Program

The Scientific Program included 70 papers and 32 posters. Two special paper sessions on the Ecology of the Near-Shore Ecosystem were presented, including "Guillemots as Indicators of the Nearshore Ecosystem" (Chairs: **Daniel Roby** and **George Divoky**) and "Seabirds and Pollution in the Nearshore Ecosystem" (Chair: **Dan Anderson**). Three plenary papers were also presented: **William Bourne** of Aberdeen University spoke on the "Differences Between Real and Imaginary Seabird Studies"; **David Duffy** of the University of Alaska spoke on "Prince William Sound Seabirds: Stability and Change"; and **Anthony Gaston** of the Canadian Wildlife Service spoke on "Age and Experience as Factors in Seabird Breeding Success: Lessons from the Thick-billed Murre". General paper sessions included a variety of topics from Population Status and Distribution to Seabird Conservation, and Ecology of Marbled and Xantus' Murrelets to Breeding and Foraging Ecology. See the abstracts from the Scientific Program starting on page 8.

### Awards

*Lifetime Achievement.* In celebration of approaching PSG's 25<sup>th</sup> year, the Lifetime Achievement Award was presented to three individuals who helped create the Pacific Seabirds Group: **William R.P. Bourne** of Aberdeen, Scotland; **James G. King** of Juneau, Alaska; and **James C. Bartonek** of Portland, Oregon. Each of these seabird scientists has also contributed in significant ways to the conserva-

tion of the world's seabirds. Look for details of these individuals and the awards in the Fall Issue of Pacific Seabirds.

*Student Awards* for Best Student Paper and Poster Awards for best student paper went to **Gail Davoren** of the University of Victoria for her paper on "Variable Time Budget of Rhinoceros Auklets at Sea Off Southwestern Vancouver Island. Honorable mention went to **Patricia Cole** of California State University at Fullerton for her paper with **Michael Horn** on "Comparative Chick Provisioning in Caspian and Elegant Terns at the Bolsa Chica Ecological Reserve in Southern California". Best student poster went to **Marc Romano** of Oregon State University for his poster with **Dan Roby** on "Effects of Diet Quality on Post-Natal Growth of Seabirds: Captive Feeding Trials". Honorable mention went to **Monica Silva** of Universidade de Lisboa (Portugal) for her poster with **J.P. Granadeiro** on "Genetic Variability of Cory's Shearwater in the NE Atlantic Revealed by DNA Fingerprinting". Congratulations students!!!

### Social Events

The meeting included fun and interesting social events as well. On Thursday 9 January, an offsite social was held at the Oregon Historical Society Museum, featuring good food and conversation, and a look into Oregon's history. On Saturday 11 January, the annual banquet featured a presentation of society, a lively speech by **George Divoky**, and an auction and raffle. The silent auction, verbal auction and raffle were successful in raising monies for PSG's Endowment Fund. A profit was made at the meeting what will benefit our general fund.

*S. Kim Nelson*

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## PROPOSED BYLAWS AMENDMENT FOR THE ENDOWMENT FUND

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As approved at Pacific Seabird Group Executive Council meeting January 11, 1997. For consideration by the membership on the fall ballot.

### ARTICLE ? . ENDOWMENT FUND.

Section 1. Name and goal. The Group may maintain an Endowment Fund, whose goal is to accumulate a core of funds, the interest on which will support the objectives of the Group.

Section 2. Trustees. The Endowment Fund shall be managed by three Trustees, who shall be members of the Group. In addition, the Treasurer of the Group shall be an ex officio Trustee. Trustees shall be appointed by the Chair and may be removed by a majority vote of the Executive Council.

Section 3. Management. The Endowment Fund shall receive monies from all Life Memberships, and from donations, bequests, and other sources as determined by majority vote of the Executive Council. The edowment Fund shall be invested as determined by unanimous agreement of the Trustees. If the Trustees cannot agree on management of the Fund, the Executive Council shall do so by majority vote.

Section 4. Expenditures. The Trustees shall report annually to the Executive Council on the funds available for expenditure. In determining the availability of funds, the Trustees shall manage the Endowment Fund to protect the principal of the Endowment Fund over time. The actual expenditure of funds shall be recommended by the Publications Committee and decided by majority vote of the Executive Council.

Section 5. Purpose of Expenditures. Funds determined by the Endowment Fund Trustees to be available for publications may only be used for the production of Pacific Seabird Group publications.

# 1998 ANNUAL MEETING IN MONTEREY, CALIFORNIA

## PACIFIC SEABIRD GROUP



### TWENTY-FIFTH ANNUAL MEETING MONTEREY, CALIFORNIA 21-25 JANUARY 1998

The 1998 Annual Meeting of the Pacific Seabird Group will be held at the Monterey Conference Center in downtown Monterey, California from 21-25 January 1998. The meeting will include special events to celebrate the 25th anniversary of the Pacific Seabird Group. As part of the celebration a symposium is being developed entitled *Seabirds in a changing ocean: advances in seabird science*. The symposium will include plenary and review papers on this theme. A meeting announcement, with symposium speakers, registration materials and a call for papers, will be mailed in September 1997. Deadlines for abstracts and registration will be due shortly thereafter.

If you have any questions or would like to assist with the planning please contact:

**Local Committee Chair:**

*Mike Parker*, USFWS, San Francisco Bay National Wildlife Refuge Complex, Post Office Box 524, Newark, California 94560.

**Program Chair:**

*Alan E. Burger*, Department of Biology, University of Victoria, Victoria, BC, Canada V8W 3N5. e-mail: aburger@uvic.ca

**Symposium Chair:**

*David C. Duffy*, Alaska Natural Heritage Program, University of Alaska, Anchorage, 707 A Street, Anchorage, Alaska 99501. e-mail: afcd1@uaa.alaska.edu

**TENTATIVE Daily Schedule****Wednesday 21 January**

Preconference meetings -open to all  
Executive Council  
Committee Meetings - to be announced  
Welcome reception in the evening

**Thursday 22 January**

Plenary Session in morning  
Paper Session in afternoon  
Poster Session/evening reception

**Friday 23 January**

Paper sessions morning and afternoon  
Reception at Monterey Bay Aquarium

**Saturday 24 January**

Paper sessions morning  
Committee meetings in afternoon  
Executive Council  
Conservation Committee  
Business meeting  
Other committee meeting as needed  
Evening banquet

**Sunday 25 January**

Field Trips - to be announced

# BOOK REVIEWS

**Catching Fish Not Birds - A Guide to Improving Your Longline Fishing Efficiency** is a 74 page booklet produced by the Nigel Brothers Parks and Wildlife Service of Tasmania, Australia. It provides practical advise to the tuna fishing industry, explaining how to reduce bait loss and bird deaths. The basic angle is that eliminating by-catch increases the number of working hooks. This booklet is illustrated with cartoons and comes in several languages; Japanese Vietnamese, Korean, and Australian (One cartoon tuna (Not Charlie) says: You Ripper! Heaps of

tucker, the birds won't be getting any.) Translate that!

Color photographs of albatross on nests and on hooks demonstrate the problem while photographs and line drawings demonstrate gear modifications to reduce by-catch and make more profit. The Chapters are How to Reduce Bait Loss and Bird Deaths, About Birds and Baits-A Fatal Attraction, How Many Birds are Caught? About the Lives of Seabirds (with a two page color Seabird Identification Guide with range maps on par with

Harrison's guide), \$ from Birds \$ from Fish, Care for Lines on Hooks. Bird line construction and Not just pub talk. The back cover has a underwater photo of schooling tuna with an inset of a child being nibbled by an albatross. The caption reads: It is conceivable that one day your kids will no longer have the opportunity to experience such an encounter with albatrosses. This booklet will hopefully delay that sad day.

By *Mark J. Rauzon*



(Continued on Page 43)

# BULLETIN BOARD

## NAKHODKA OIL SPILL IN THE SEA OF JAPAN

On 2 January 1997, an explosion aboard the Russian tanker *Nakhodka* resulted in a large oil spill (over 1 million gallons) in the Sea of Japan about 150 km off Honshu. By mid March, about 1,200-1,500 oiled birds (dead and alive) had been recovered along much of the west coast of Honshu. Over half of birds recovered were Ancient Murrelets and Rhinoceros Auklets. Small numbers of Marbled Murres (Asiatic subspecies) and endangered Japanese Murres also were recovered. Hundreds of birds underwent cleaning but rehabilitation facilities and efforts were suboptimal. Koji Ono and John Fries, joint coordinators of PSG's Japan Seabird Conservation Committee, were very active in efforts to enumerate how many birds were impacted. They worked closely with several interested groups to respond to the spill through an Oiled Bird Information Committee, composed of government agencies and private groups. International Bird Rescue personnel also was on the scene in early February to assist rehabilitation efforts.

From 14-28 January 1997, a team of three U.S. scientists, all PSG members (Roger Helm, U.S. Fish and Wildlife Service; Harry Carter, U.S. Geological Survey; and Scott Newman, University of California), travelled to Japan to provide advice and assistance on oiled wildlife issues to the Japan Environment Agency and several non-profit groups (Wild Bird Society of Japan, Japan Alcid Society, Wildlife Rescue Veterinarians Association, and others). These groups were particularly interested in learning how to accurately measure the impact from the spill on seabirds and learning how to care appropriately for live oiled birds. Helm, Carter, Ono, and Fries toured the spill zone to observe and discuss bird collection techniques.

Newman gave oiled wildlife care lectures and several demonstrations on bird cleaning and medical techniques used to care for birds while visiting rehabilitation and release centers throughout the expanding spill zone.

A report on this trip and recommendations provided was prepared and is titled: "Seabird injury and wildlife care during the 1997 *Nakhodka* oil spill in the Sea of Japan: observations and recommendations by a team of U.S. scientists in January 1997". Copies of this report are available from: Roger Helm, U.S. Fish and Wildlife Service, Ecological Services, 911 N.E. 11th Avenue, Portland, Oregon 97232.

An additional summary of the spill can be found in the spring 1997 issue of "The Pipeline", a publication of the oiled wildlife care network which can be obtained from Nancy Ottum at [ndotum@ucdavis.edu](mailto:ndotum@ucdavis.edu).

*Harry R. Carter, Roger C. Helm, and Scott H. Newman*

## BIOLOGY OF MARINE MAMMALS/EUROPEAN CETACEAN SOCIETY MEETING

### TWELFTH BIENNIAL CONFERENCE ON THE BIOLOGY OF MARINE MAMMALS AND TWELFTH ANNUAL CONFERENCE OF THE EUROPEAN CETACEAN SOCIETY

Sponsored by The Society for Marine Mammalogy and the European Cetacean Society

#### FIRST ANNOUNCEMENT

The 12th Biennial Conference on the Biology of Marine Mammals and the 12<sup>th</sup> Annual Conference of the European Cetacean Society will be held together as the WORLD MARINE MAMMAL SCIENCE CONFERENCE in Monaco from 20 to 25 January 1998. It will be hosted by the Congress Center of Monaco and the adjacent Hotel Loews in Monte-Carlo.

The Principality of Monaco (including Monaco-ville and Monte-Carlo) is located on the Mediterranean Sea, surrounded by French small cities, and closed to the French-Italian border. The closest international airport is in Nice (France) linked to Monaco by a motorway (20 miles of sometimes heavy traffic), train (20 minutes) and helicopter (6 minutes). For the

international flights arriving in Paris, there are domestic flights to Nice every half an hour.

The current language in Monaco is French but most people speak Italian and many speak English. As usual, the only language of the meeting will be English. The Monégasque currency is the French Franc (FF), US\$1 is equivalent to 5 FF.

Many hotels are available in the Principality and in the surrounding French cities or villages. Within a walking distance from the Congress Center, hotel rates range from \$25 to \$120 per person per night, depending on the hotel standards (1 to 4 stars) and the room chosen (single to triple). There is also a small Youth Hostel at \$15 per person per night. Detailed information on hotels will be provided in the second announcement. As Monaco is a very touristic area, we suggest participants book their hotel room as soon as possible.

Registration material and abstract submission forms will be mailed to members in spring 1997. Conference information will also be posted on MARMAM internet discussion, the SMM home page (<http://pegasus.cc.ucf.edu/~smm>) and the ECS home page (<http://web.inter.nl.net/users/J.W.broekema/ecs.htm>).

The deadline for abstract submission is 30 June 1997. Abstracts may be submitted as hard copy, fax or e-mail in order to meet the submission deadline. HOWEVER, all abstracts submitted by fax or e-mail MUST be followed-up with a camera-ready hard copy. Proposals for evening symposia and workshops should be submitted to: Roger Gentry (Scientific Program Committee Chair) NMFS-NOAA 7600 Sand Point Way NE, Seattle, WA, USA 98115. Telephone: (206) 526 4032. Facsimile: (206) 526-6615. E-mail: [roger\\_gentry@noaa.gov](mailto:roger_gentry@noaa.gov)

Contact: Anne Collet (Program Committee Chair), World Marine Mammal Scientific Conference Centre de Recherche sur les Mammifères Marins, Port des Minimes, 17000 La Rochelle, FRANCE. ph: +33 (0)546 44 99 10 fax: +33 (0)546 44 99 45 email: [crmm@univ.lr.fr](mailto:crmm@univ.lr.fr)

*fide Miklos D.F. Udvardy*

<-> on a new line, to LIST-SERVER@UCT.AC.ZA

## SEABIRD LISTSERVER

### SEABIRD-L

Membership on Seabird-l, a listserver about seabirds and for marine ornithologists, is not restricted in any way. The listserver was initiated in August 1993 to help marine ornithologists exchange information and to keep in contact on a worldwide basis. In March 1997 membership stood at just under 540. Examples of its use are, requests for and offers of information, ideas, data and collected material (such as skeletal and soft-tissue samples), advertising employment, fellowship and volunteer opportunities, notices of meetings, availability of written materials (e.g. expedition reports, books, proceedings, reprints), etc. All e-mail messages posted on Seabird-l to <seabird@uct.ac.za> will automatically be sent to all subscribers. Seabird-l is co-managed by John Cooper (jcooper@botzoo.uct.ac.za) and Andrea Pies (aplos@botzoo.uct.ac.za). Receipt of this message does not mean that you have automatically been made a subscriber of the listserver. Your privacy is being fully respected and your e-mail address will only be added to Seabird-l's address list (and therefore be available to all its members) if you join the listserver as detailed below.

To join Seabird-l send to  
LISTSERVER@UCT.AC.ZA

the following in the first line of the message field of an e-mail message,  
**SUBSCRIBE SEABIRD <YOUR SURNAME, FIRST NAME>**. This must be followed on a new line by a double dash <->. To post messages send them to SEABIRD@UCT.AC.ZA. You will receive your message back as confirmation it has been sent out to all subscribers, but only if you have previously subscribed.

To receive the information message on the SEABIRD listserver, type SEABIRD in the message field, followed by a double dash <-> on a new line, to LIST-SERVER@UCT.AC.ZA

### INFORMATION SEABIRD

Also available are archival files which contain e-mail messages sent to the listserver in the past. These are available by typing INFORMATION SABIRD in the message field, followed by a double dash

### INDEX AND REVIEW SEABIRD

This will automatically send you the list of archive files, along with instructions on how to retrieve them. Also available is an e-mail address list which contains all the current subscribers to the listserver. These are automatically accessible by typing INDEX SEABIRD and REVIEW SEABIRD, respectively in the first line of the message field, followed by a double dash <-> on a new line, to LIST-SERVER@UCT.AC.ZA

### UNSUBSCRIBE

To unsubscribe from Seabird-l, follow exactly the procedure above for subscribing, but replacing <SUBSCRIBE> with <UNSUBSCRIBE>.

**John Cooper**, Marine Advisor, Independent World Commission on the Oceans, Ministry of Water Affairs and Forestry, Pvt Bag X9052, Cape Town 8000, South Africa. e-mail:

zop@dwarf-par.wcape.gov.za Telephone: +27-21-457-246 ext. 251. Facsimile: +27-21-453-362. Home telephone: +27-21-685-1357 (answering machine).

## ALASKA-RUSSIAN FAR EAST SEABIRD BIBLIOGRAPHIC DATABASE

The U.S. Fish and Wildlife Service and the All-Russia Institute of Nature Conservation and Reserves have created an Alaska-Russian Far East Seabird Bibliographic Database that contains 2,836 references on seabirds in Alaska and the Russian Far East. The format allows users to rapidly search for information and retrieve citations using key words. It is an interactive PC database that uses Pro-Cite (IBM, version 2.01) software. Pro-Cite is available from: Research Information Systems, 2355 Camino Vida Roble, Carlsbad, CA 92009-1572, 619-438-5526. Requests for copies of the Bibliographic Database on computer diskette should be directed to: Kent Wohl, Nongame Migratory Bird Management, U.S. Fish and Wildlife Service, 1011 E. Tudor Road, Anchorage, AK 99503 USA. E-mail: kent\_wohl@mail.fws.gov.

## NORTHWEST WILDLIFE HABITATS AND SPECIES AS- SOCIATIONS REQUEST

Information is needed by the Oregon and Washington Departments of Fish and Wildlife for the publication, "Wildlife Habitats and Species Associations Within Oregon and Washington Landscapes: Building a Common Understanding for Management." The objective is to provide a comprehensive source of information on wildlife-habitats relationships for all wildlife species, including marine birds, occurring in Oregon and Washington. Obtaining accurate, "state of the science" information is our top priority. In addition to reviewing the current literature and sponsoring scientific panels, we are seeking information from ongoing research and unpublished studies. In particular we are interested in habitat association data, life history data, and information on the effects of management practices. We will be using this information to help complete detailed matrixes which will accompany the published documents in the form of a computer database. Our matrix-development work will take place during the summer and fall of 1997, therefore we encourage you to submit your information by September 30, 1997. This should give us sufficient time to summarize this field season's data. Please send copies of theses, progress reports, etc. to: Kelly A. Bettinger, Washington Department of Fish and Wildlife (WDFW), Habitat Management Program, 600 North Capitol Way North, Olympia, WA 98501. Telephone: (360) 902-2604. For additional information contact project leaders, David Johnson, WDFW, Ecosystem Planning Section, Olympia. Telephone: (360) 902-2946. E-mail: johnsdjhj@dfw.wa.gov In Oregon, Thomas A. O'Neil, Oregon Department of Fish and Wildlife, Ecological Analysis Center, 7118 NE Vandenberg Avenue, Corvallis, OR 97330. Telephone: (541) 757-4186. E-mail: biota@peak.org

# REPORT OF THE SECRETARY - 1996

## SUMMARY OF PROPOSED MINUTES OF THE PACIFIC SEABIRD GROUP EXECUTIVE COUNCIL MEETING

(NOTE: The full text of the Proposed Minutes is available from the Secretary. The Minutes will become official when they are approved at the 1998 Executive Council meeting.)

by Vivian Mendenhall

The Council met on 7 and 11 January 1997 at the Marriott Hotel, Portland, Oregon. Thirteen members attended: Bill Everett, Roy Lowe, Jan Hodder, Vivian Mendenhall, Scott Johnston, Mark Rauzon, Jim Lovvorn, Elizabeth McLaren, Tony Gaston, Kim Nelson, David Duffy, Pat Baird, and Craig Harrison. Proxies were held for the missing members. Chair Bill Everett ran this year's Executive Council meeting with a concern for making decisions explicit and avoiding long discussions. We adhered more closely to Robert's Rules of Order than in the past. This has resulted in a longer list of "motions" than is usual in the Secretary's Report. Reports of officers and committees were provided before the meeting by e-mail or in Pacific Seabirds and were discussed only briefly at the meeting.

The minutes of the November 1995 meeting were approved.

### OLD BUSINESS

**FUTURE MEETINGS:** We are trying to reserve Asilomar for our gala 25<sup>th</sup> meeting in early 1998, but the facility is not yet accepting applications for this period. A motion was approved to approach the Monterey Convention Center for our 1998 meeting if Asilomar cannot take our reservation by 28 February 1997. Our 1999 meeting may be held at Rosario on Orcas Island in the San Juan Islands, but no decision was made.

**PSG HANDBOOK:** An administrative handbook for future PSG officers is being assembled. Nelson has drafted guidelines for organizing our Annual Meetings and is looking for volunteers to help expand the draft.

**FINANCIAL MATTERS:** Total expenditures per PSG member (estimated at \$25.36 yearly) are higher than dues (\$20). This is partly because Life Memberships go into the Endowment Fund instead of contributing to operating expenses. The shortfall in dues is made up by proceeds from our annual meetings, auctions, and interest from investments. A motion to increase annual dues by \$5 did not pass. The budget was approved. Our tax returns have become more complicated, due to the amount of funds we have received recently for special projects. A motion was approved to get our 1997 taxes done by a professional. Liability insurance for officers and directors is commonly held by nonprofit corporations, but PSG has never purchased any. Premiums would cost about \$1,200 per year for a \$1 million policy. A motion was approved to acquire liability insurance for the Executive Council. Overhead on PSG's contracts was discussed. Overhead need not be high, but it should cover expenses such as tax advice and liability insurance. PSG has given small grants in past years to help support research. A motion was approved to table this issue (i.e., postpone it to another year).

**OSNA MEMBERSHIP:** PSG is considering whether to apply for membership to Ornithological Societies of North America. Benefits would include maintenance of our mailing list by OSNA, and our dues notices would be sent out automatically along with those of other member societies. Costs to PSG would include our dues to OSNA, and we would be expected to send representatives to the annual AOU meetings (OSNA meetings also are held there). The Executive Council was concerned that PSG continue its established and successful functions if we were invited to join OSNA. A motion was approved to begin discussion with OSNA about the conditions under which PSG could join.

**ENDOWMENT FUND:** The Endowment Fund has never explicitly been described in the Bylaws. A bylaws amendment was

drafted that would specify the existence, funding, and basic management of the Endowment Fund and the use of the Fund's proceeds. A motion was approved to submit the amendment to a vote of the PSG membership. A second motion was approved that tax advice regarding endowment funds be obtained first.

**VERMEER AWARD:** This award was initiated by the Local Committee at the November 1995 meeting. At the time, PSG was requested to participate in giving future awards. However, Simon Fraser University has decided to administer this award, and PSG's involvement is no longer needed.

### NEW BUSINESS

**IUCN MEMBERSHIP:** Membership in the International Union for the Conservation of Nature would cost PSG \$250 per year and would increase our visibility in conservation issues. A motion was approved that PSG apply for membership.

A PSG WEB SITE has been set up, but additions and maintenance will be needed. Elizabeth McLaren expressed interest in helping. (No motion.)

**1998 PSG AWARDS:** Following a new Awards procedure that was set up last year, the nominating committee (Mark Rauzon, Bill Everett, and Kim Nelson) presented candidates for the PSG Special Achievement Award. Two candidates were approved by secret ballot of the Executive Council. No candidates were proposed for Lifetime Achievement Awards.

**PACIFIC SEABIRDS:** Regional Representatives are supposed to report annually on research work and management issues for their Regions. In many cases a member resides in one region but works in another. It was agreed (without a motion) that the representatives' reports should cover work according to the region where it is done rather than according to where the worker resides.

## REPORT OF THE SECRETARY

OSNA JOINT MEETING: PSG has received an invitation to participate in a joint meeting of several ornithological societies in May 1998 in St. Louis. A motion was approved to thank OSNA for the invitation, but to decline it, since PSG is planning its special 25<sup>th</sup> annual meeting for that year.

STUDENT MENTORING: It was suggested that the Local Committees at future meetings hold an "icebreaker" reception

where students and other young professionals could interact with established professionals.

VISION FOR THE FUTURE: Tony Gaston and Julia Parrish have drafted a vision document for PSG. A motion was approved to appoint a small group to work on this draft. It would be published in *Pacific Seabirds*, and comments from the membership would be solicited. A planning retreat for the Executive Council to

consider future directions for PSG also will be arranged.

FISCAL MATTERS: A motion was approved to transfer all fundraising proceeds from this meeting (silent auction, auction, and raffle) to the Endowment Fund. A motion was approved that the Treasurer report on anticipated yearly expenses at the next meeting of the Council. At that time the Council can decide on an amount to be transferred from liquid funds to the Endowment Fund.



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# PUBLISHED PROCEEDINGS OF SYMPOSIA OF THE PACIFIC SEABIRD GROUP

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At irregular intervals the Pacific Seabird Group holds symposia at its annual meetings. Published symposia are listed below. Available symposia may be purchased by sending a check or money order (in US Dollars, made payable to Pacific Seabird Group) to Jan Hodder, Treasurer, Pacific Seabird Group, Oregon Institute of Marine Biology, University of Oregon, Charleston, Oregon 97420 USA. Prices include postage (surface rates) and handling. See the following membership application/publication order form to order symposia.

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**SHOREBIRDS IN MARINE ENVIRONMENTS.** Frank A. Pitelka (Editor). Proceedings of an International Symposium of the Pacific Seabird Group. Asilomar, California, January 1977. Published June 1979 in Studies in Avian Biology, Number 2. Out of print.

**TROPICAL SEABIRD BIOLOGY.** Ralph W. Schreiber (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Honolulu, Hawaii, December 1982. Published February 1984 in Studies in Avian Biology, Number 8. \$12.00.

**MARINE BIRDS: THEIR FEEDING ECOLOGY AND COMMERCIAL FISHERIES RELATIONSHIPS.** David N. Nettleship, Gerald A. Sanger, and Paul F. Springer (Editors). Proceedings of an International Symposium of the Pacific Seabird Group, Seattle, Washington, January 1982. Published 1984 as Canadian Wildlife Service, Special Publication. Out of print.

**ECOLOGY AND BEHAVIOR OF GULLS.** Judith L. Hand, William E. Southern, and Kees Vermeer (Editors). Proceedings of an International Symposium of the Colonial Waterbird Society and the Pacific Seabird Group, San Francisco, California, December 1985. Published June 1987 in Studies in Avian Biology, Number 10. \$18.50.

**AUKS AT SEA.** Spencer G. Sealy (Editor). Proceedings of an International Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published December 1990 in Studies in Avian Biology, Number 14. \$16.00.

**STATUS AND CONSERVATION OF THE MARBLED MURRELET IN NORTH AMERICA.** Harry C. Carter, and Michael L. Morrison (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Pacific Grove, California, December 1987. Published October 1992 in Proceedings of the Western Foundation of Vertebrate Zoology, Volume 5, Number 1. \$20.00.

**THE STATUS, ECOLOGY, AND CONSERVATION OF MARINE BIRDS OF THE NORTH PACIFIC.** Kees Vermeer, Kenneth T. Briggs, Ken H. Morgan, and Douglas Siegel-Causey (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Canadian Wildlife Service, and the British Columbia Ministry of Environment, Lands and Parks, Victoria, British Columbia, February 1990. Published 1993 as Canadian Wildlife Service, Special Publication, Ministry of Supply and Services, Canada, Catalog Number CW66-124-1993E. Free. Write: Publications Division, Canadian Wildlife Service, Ottawa, Ontario, K1A OH3, Canada.

**BIOLOGY OF MARBLED MURRELETS - INLAND AND AT SEA.** S. Kim Nelson and Spencer G. Sealy (Editors). Proceedings of a Symposium of the Pacific Seabird Group, Seattle, Washington, February 1993. Published 1995 in Northwestern Naturalist, Volume 76, Number 1. \$20.00.

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Pacific Seabird Group Symposia are initiated by one or more persons with interest in a particular topic area, resulting in a collection of papers usually presented at an annual meeting of the Pacific Seabird Group. Some symposia are further refined and then published as a Symposium of the Pacific Seabird Group. Individuals interested in promoting future symposia must first contact the Coordinator of the Publications Committee, and the appropriate annual meeting scientific program coordinator, prior to initiating the process leading to the actual symposium session and possible publication. The necessary guidelines outlining the steps and responsibilities for obtaining approval, organizing, holding and publishing Pacific Seabird Group Symposia will be provided. This opportunity is available to all members of the Pacific Seabird Group.

# PACIFIC SEABIRD GROUP COMMITTEE COORDINATORS

Contact committee coordinators for information and activities of committees and how you can participate.

## Conservation Committee

**Craig S. Harrison**, 4001 North 9th Street, Arlington, VA 22203 USA. Telephone (202) 778-2240, Facsimile: (202) 778-2201, e-mail: charison@hunton.com

## Election Committee

**Pat Baird**, Department of Biology, California State University, Long Beach, CA 90840 USA. Telephone: (310) 985-1780, Facsimile: (310) 985-2315, e-mail: patbaird@csulb.edu

## Japanese Seabird Conservation Committee

**Koji Ono**, Office: Hokkaido Seabird Center Kita 6-1, Haboro, Tomamae 078-41 Japan. Telephone: 011-81-1646-9-2080, Facsimile: 011-81-1646-9-2090. Home: 2-506, Sakaemachi 93-12 Haboro, Tomamae 078-41 Japan. Telephone & facsimile: 011-81-1646-2-1324, e-mail: kojiono@gol.com and **John Fries**, Laboratory for Marine Biology, Faculty of Science, Toho University, 2-2-1 Miyama, Funabashi, Chiba 274, Japan. Telephone (office): 011-81-474-72-5235, Facsimile (office): 011-81-0474-72-5236 (ATTN: John Fries), e-mail: jnfries@bio.sci.toho-u.ac.jp

## Marbled Murrelet Technical Committee

**Thomas E. Hamer**, Hamer Environmental, 2001 Highway 9, Mt. Vernon, WA 98274 USA. Telephone: (360) 422-6510, Facsimile (360) 422-6510, e-mail: hamert@aol.com

## Mexico Committee

**Mauricio Cervantes A.**, ITESM- Campus Guaymas, Bahia Bacochibampo s/n, Col. Lomas de Cortes, A.P. 484 Guaymas, Sonora 85400 MEXICO. e-mail: mcervant@itesmvfl.rzs.itesm.mx and **William Everett**, Endangered Species Recovery Council, P.O. Office Box 1085, La Jolla, CA 92038 USA. Telephone: (619) 589-0870, Facsimile: (619) 589-6983, e-mail: esrc@cts.com

## Publications Committee

**Steven M. Speich**, 4720 N. Oeste Place, Tucson, AZ 86749 USA. Telephone: (520) 760-2110, Facsimile: (520) 760-0228 (call ahead), e-mail: sspeich@azstarnet.com

## Restoration Committee

**Ken Warheit**, P.O. Box 178, Tenino, WA 98589 USA. Telephone (360) 902-2595, Facsimile: (360) 902-2946, e-mail: warheit@u.washington.edu

## Seabird Monitoring Committee

**Scott Hatch**, Biological Resources Division, U.S. Geological Survey, Alaska Scinece Center, 1011 E. Tudor Rd., Anchorage, AK 99503 USA. Telephone: (907) 786-3529, Facsimile: (907) 786-3636, e-mail: scott\_hatch@nbs.gov

## Xantus' Murrelet Technical Committee

**William Everett**, Endangered Species Recovery Council, P. O. Box 1085, La Jolla, CA 92038 USA. Telephone: (619) 589-0870, Facsimile: (619) 589-6983, e-mail: esrc@cts.com

## PSG Delegates to the American Bird Conservancy

**Craig S. Harrison**, 4001 North 9th Street, Arlington, VA 22203 USA. Telephone (202) 778-2240, Facsimile: (202) 778-2201, e-mail: charrison@hunton.com, and **Malcolm Coulter**, P.O. Box 48, Chocorua, NH 03817 USA. Telephone: (603) 323-9342, e-mail: coultermc@aol.com

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## PSG LIFE MEMBERS 1996

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|                      |                     |                       |
|----------------------|---------------------|-----------------------|
| David G. Ainley      | Douglas J. Forsell  | Edward C. Murphy      |
| Daniel W. Anderson   | Michael Fry         | David R. Nysewander   |
| Pat H. Baird         | Lisa Haggblom       | Harou Ogi             |
| Robert Boekelheide   | Judith L. Hand      | Koji Ono              |
| Kenneth T. Briggs    | Craig Harrison      | C. John Ralph         |
| Joanna Burger        | Scott A. Hatch      | Chad Roberts          |
| Ellen W. Chu         | Monica H. Zürcher   | Palmer C. Sekora      |
| Roger B. Clapp       | Joel D. Hubbard     | Kouzi Shiomi          |
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## RECIPIENTS OF PSG's LIFETIME ACHIEVEMENT AWARD

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|                     |                 |                   |
|---------------------|-----------------|-------------------|
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| Miklos D.F. Udvardy | James G. King   |                   |

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## RECIPIENTS OF PSG's SPECIAL ACHIEVE- MENT AWARD

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Arthur L. Sowls

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# Pacific Seabird Group

## Membership Application/Publication Order Form

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(Please Copy)

**Membership** (includes subscription to *Pacific Seabirds*)

Individual and Family \$20.00 \$ \_\_\_\_\_

Student (undergraduate and graduate) \$13.00 \$ \_\_\_\_\_

Life Membership<sup>1</sup> (optional payment plan, six \$100 installments) \$600.00 \$ \_\_\_\_\_

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*Ecology and Behavior of Gulls* \_\_\_\_\_ x \$18.50 \$ \_\_\_\_\_

*Auks at Sea* \_\_\_\_\_ x \$16.00 \$ \_\_\_\_\_

*Status and Distribution of the Marbled Murrelet in North America* \_\_\_\_\_ x \$20.00 \$ \_\_\_\_\_

*Biology of Marbled Murrelets: Inland and at Sea* \_\_\_\_\_ x \$20.00 \$ \_\_\_\_\_

**Send check or money order** (in U.S. Dollars, made payable to the Pacific Seabird Group) to:

Jan Hodder, Treasurer, Pacific Seabird Group

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*Prices include postage (surface rate) and handling.*

**Total enclosed** \$ \_\_\_\_\_

<sup>1</sup> See front cover Tax Donations Status

<sup>2</sup> Proceeds from life Memberships and contributions go to the Endowment Fund, a fund to support the publications of the Pacific Seabird Group.

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